WATER SUPPLY REVIEW
and
SNOW SURVEY SUMMARY

ALBERTA ENVIRONMENT
TECHNICAL SERVICES DIVISION

Prepared by:
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1982-83

COVER PHOTO
ALBERTA GOVERNMENT PHOTO

The Water Supply Outlook and Snow Survey Bulletin is issued four times each year for March 1, April 1, May 1 and June 1. Water Supply updates are also published for July 1 and August 1, with a summary in October.

Units of Measure

Parameter	Units of Measure (metric)	Conversion to Imperial Units
Snow depth	centimetres	2.54 cm = 1 in.
Water equivalent	millimetres	25.4 mm = 1 in.
Elevation	metres	1 m = 3.28 ft
Streamflow	cubic metres per second	1 m^3/s = 35.3 cfs
Volume of Water	cubic metres	1 x $10^6 m^3$ = 811 ac-ft

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ACKNOWLEDGEMENTS

The Alberta River Forecast Centre and the Survey Branch of Alberta Environment wish to acknowledge the Alberta Forest Service, Water Survey of Canada, and Atmospheric Environment Service for their assistance in providing precipitation* and streamflow data* for the preparation of this report.

* Note: It should be noted that the natural flows as calculated in Table 1, as well as the hydrographs presented in each basin section, is based on tentative hydrometric record and is subject to change. The snow survey data and supplementary storage gauge reading as found in Appendix A is final data and is not subject to change.

WATER SUPPLY REVIEW

Weather Snowpack and Streamflow Conditions Review

Precipitation during the winter of 1982-83 was below normal for nearly all areas of Alberta. Low snowpacks on the plains and in the mountains were further eroded by mild winter temperatures. For most areas spring precipitation was also below normal.

Spring snowmelt in the plains occurred somewhat earlier than normal. By April 1 the plains snowpack had already melted except for the Peace and other Northern Alberta areas. Snowmelt in these remaining plains areas melted in early April. Figure 1 is a map showing plain area runoff conditions in 1983.

Mountain snowmelt runoff also occurred somewhat earlier than normal with peak streamflow from snowmelt occurring during the last week of May for most rivers. The volume of water generated from the mountain snowmelt as well as the peak snowmelt discharges were below normal. No flooding resulted from these flows.

Summer precipitation was below normal in the headwater areas of the South Saskatchewan, North Saskatchewan and Athabasca River Basins. Below normal summer precipitation also occurred in the plains area of the South Saskatchewan Basin. However, several major storms hit the Grande Prairie, Peace River and Swan Hills areas during June and July producing several major flood events.

A summary of winter and summer precipitation for the 1982-83 runoff season are presented in Figures 2 through 9.

Flows at North Saskatchewan River at Edmonton were below normal for most of the summer. These below normal flows resulted from reservoir regulation associated with the filling of Lake Abraham and Brazeau Reservoirs. No apparent difficulties resulted from these lower flows.

Below normal natural flows this summer coupled with hydroelectric power production operations resulted in below normal flows for the Bow River at Calgary. Natural flows through Calgary were augmented during September and October with releases from upstream reservoirs. This was done to help meet irrigation requirements downstream of Calgary. Despite this augmentation, the flow past the Bassano Dam was very close to minimum for most of September and October.

Water Supply problems also occurred in the Oldman River Basin. The low natural flow, and minimum releases from upstream reservoirs kept the Oldman River at Lethbridge below normal most of the summer. Due to low flows in the upper Oldman River and high irrigation demands, the Lethbridge Northern Irrigation District had to curtail irrigation twice during the past summer. Low flows in Willow Creek also restricted irrigation from that stream.

The water supply conditions during 1983 for each river basin in central and southern Alberta are discussed individually on the following pages. Table 1 is a summary of water supply in 1983 for these basins.

The snow survey and storage gauge data presented in Appendix A are final data. The natural flow data as calculated for Table 1, as well as the streamflow data for the hydrographs accompanying each section, are based on tentative hydrometric records and are subject to change.

Water Storage Situation

As of October 1, all reservoirs in the Bow River Basin were at below normal levels. Diversions during all of October were required to bring the irrigation reservoirs to normal levels. The hydroelectric power reservoirs will, however, go into their winter drawdown schedules with below normal storage. The water supply is adequate to ensure sufficient flow through Calgary this coming winter.

Reservoirs in the Oldman basin were generally at below or slightly below normal levels as of October 1, 1983. The Chin Reservoir was an exception with above normal storage. Flows downstream of the Waterton and St. Mary Dams and also below the Belly River wier were at or near minimum values for most of the summer and fall. Only for a short period near the end of May were these flow releases greater than the minimum requirements.

In the North Saskatchewan River Basin, Lake Abraham and Brazeau Reservoirs were at normal levels for October 1.

OLDMAN RIVER BASIN

Weather, Snowpack and Streamflow Conditions Review

Snowpack conditions as of March 1, 1983 were, generally, much below normal. Snowpacks along the continental divide were only slightly below normal but they decreased rapidly to the east. The plains area snowpack was much below normal. These below average snowpacks were a result of below normal precipitation coupled with mild winter temperatures.

By April 1 most of the plains area of the basin was free of snow. The light snowpacks melted early generating much below normal plains area runoff. Several minor March storms occurred but the moisture was quickly absorbed into the ground, and no significant runoff resulted. Precipitation for March was normal to above normal in the plains but below normal in the mountains. This dry trend continued throughout the spring. April and May were both drier than normal.

By mid-May, the mountain snowpack began to melt rapidly, with streamflow from snowmelt peaking by the end of the month. Traditional heavy June rain storms did not occur, therefore streamflow dropped rapidly during June to much below normal values. It was mid-July before any significant rainfall runoff occurred.

Above normal July precipitation gave only a slight reprieve to the below normal runoff situation. By the last week in July, flow had once again dropped to below normal values and remained that way for the rest of the season. The following hydrographs depict the runoff as it occurred this year at several major points in the basin.

Figures 2 through 9 summarize winter and summer precipitation.

Water Supply Volume Forecast

In the spring of 1983, forecasts based on existing conditions pointed to much below normal runoff in the plains area and only slightly below normal runoff from the mountains.

As expected, plains area runoff was much below normal but the mountain area situation continued to worsen throughout the runoff season. By the first of June the situation had deteriorated significantly and minor water supply problems were anticipated. Above normal July precipitation helped to slow down the inevitable. Irrigation in the Lethbridge Northern Irrigation District had to be curtailed twice this summer. Irrigation on Willow Creek also had to be restricted. Releases from Chain Lakes Reservoir during August and September did, however, lessen some of the Willow Creek problems.

Natural flow this summer throughout the Oldman Basin was much below normal. Based on tentative hydrometric records, calculated total natural flow for the months of April through September ranged from 59 percent of normal for the Oldman River near Brocket to 78 percent of normal for the Belly River near Mountainview. The natural flow for the Oldman River at Lethbridge was only 64 percent of normal. A detailed summary of water supply conditions in the Oldman basin can be found in Table 1.

Water Storage Situation

Water in storage as of March 1 was at near normal levels for the Waterton-St. Mary system. Ridge Reservoir had been drawn down for maintenance during the winter. To offset Ridge's reduced storage, the St. Mary and Chin Reservoirs had above normal storage. Spring plains area runoff was very light and therefore did not contribute much to the total storage situation. During April, water was moved from the Waterton and St. Mary Reservoirs to replenish Ridge reservoir. Total storage for this period increased only slightly.

Nearly all available flow in the Waterton, Belly and St. Mary Rivers, except for riparian flow requirements, was stored this summer except for a brief period during the latter part of May and the first week of June. Total system storage increased until the first of August when irrigation demands started to exceed natural supply. Storage decreased throughout August and September. No water restrictions had to be imposed for those districts receiving water from this system.

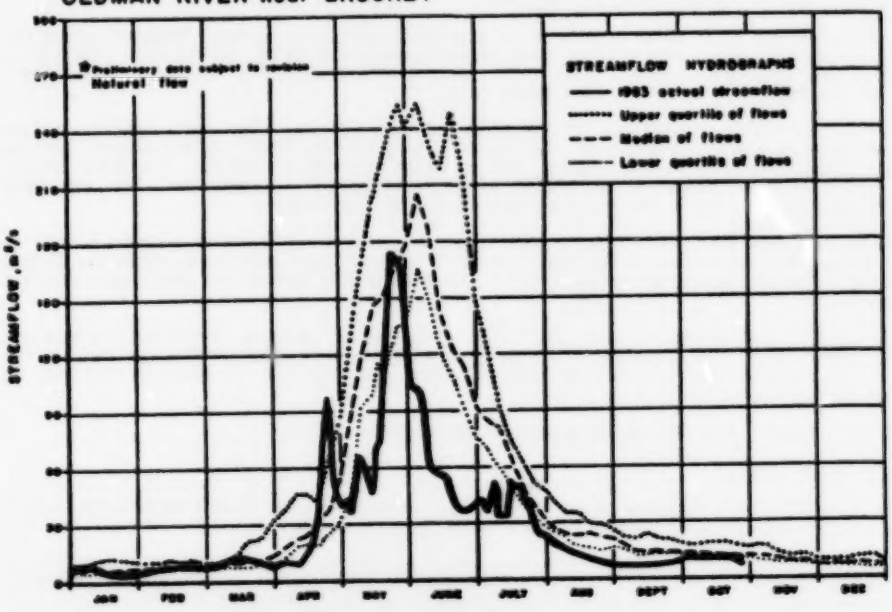
The Lethbridge Northern Irrigation District was not as fortunate as the other districts. Keho Reservoir was brought to full supply level by Mid-May but, by the end of May, demand was greater than the system was capable of diverting. Keho was drawn on heavily until it reached its minimum level and irrigation by the District was shut down on July 12. On July 17 irrigation was resumed. By the second week in August the Oldman River flow became less than the District was capable of diverting. Diversions then became a function of the river flow which was dropping steadily. By September 1, water in Keho Reservoir was being used faster than it was replenished and irrigation by the District was shut down again from September 16 to 26.

The following table compares the volume of flow for the period April 1, 1983 to September 30, 1983 (as a percent of normal) with the volume of flow from two recent low flow years.

	1977	1979	1983
St. Mary near International Boundary	56	85	74
Belly River near Mountain View	56	73	78
Waterton River at Waterton Park	53	72	74
Oldman River at Brocket	33	71	59
Oldman River at Lethbridge	39	68	64

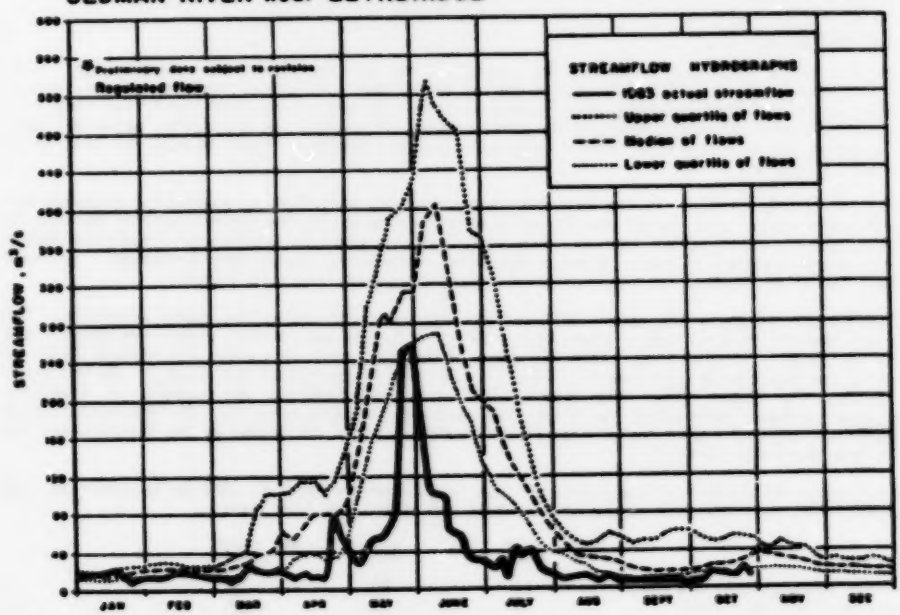
Table 2 is a summary of water storage conditions as of October 1, 1983.

OLDMAN RIVER near BROCKET



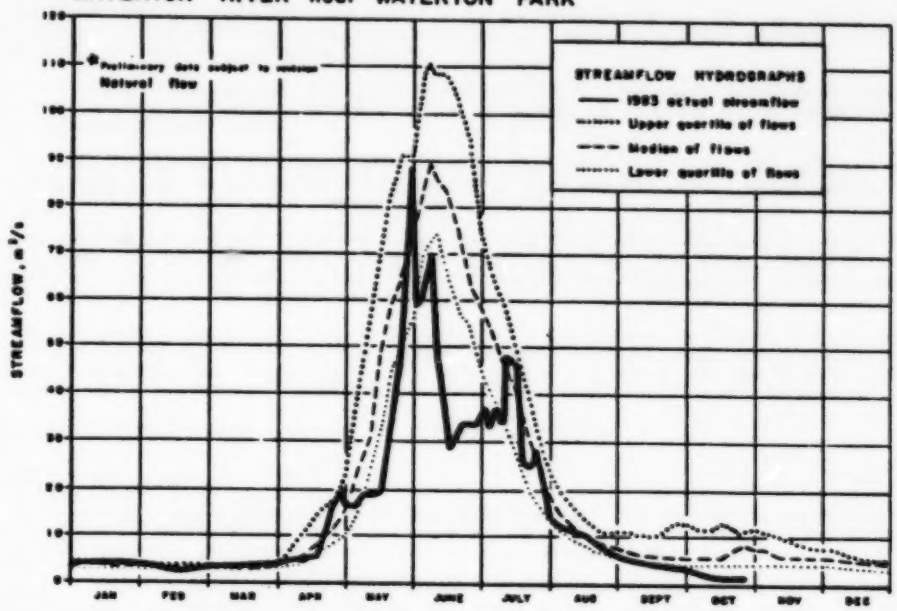
NOTE: Upper quartile, median, and lower quartile of flows based on 1960 - 1979 period of record.

OLDMAN RIVER near LETHBRIDGE



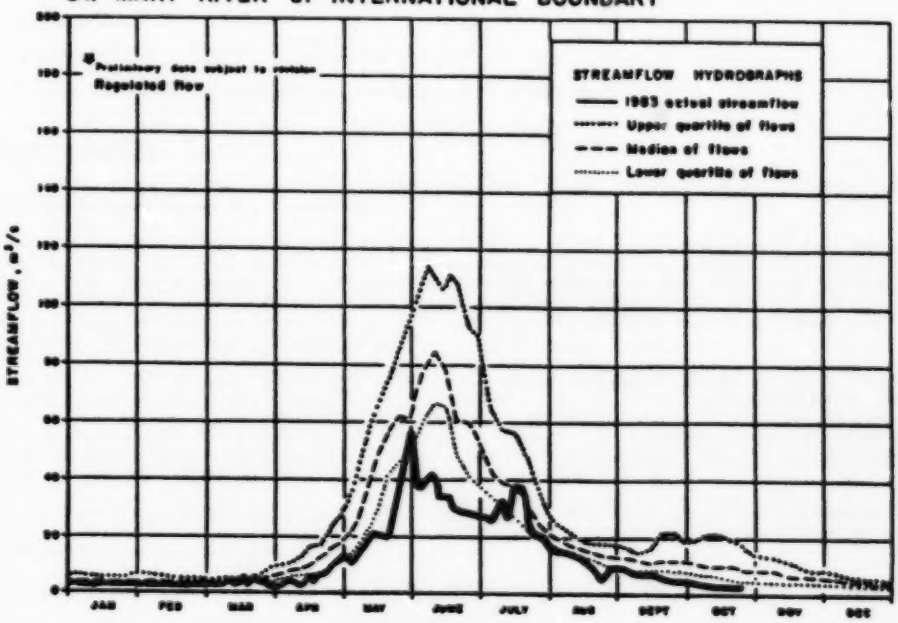
NOTE: Upper quartile, median, and lower quartile of flows based on 1960 - 1979 period of record.

WATERTON RIVER near WATERTON PARK



NOTE: Upper quartile, median, and lower quartile of flows based on 1930 - 1970 period of record.

ST. MARY RIVER at INTERNATIONAL BOUNDARY



NOTE: Upper quartile, median, and lower quartile of flows based on 1930 - 1970 period of record.

BOW RIVER BASIN

Weather, Snowpack, and Streamflow Conditions Review

In March 1983, the snowpack in the foothills and mountains of the Bow Basin was normal to slightly below normal. In the plains areas the snowpack was sparse. Very little runoff resulted from the melting of the plains snowpack, which occurred in March.

The snowpack in the mountains and foothills remained virtually unchanged through April and early May. A storm in the third week of April caused high flow on the Highwood River for a brief period but the river quickly returned to normal levels.

The mountain and foothills snowpack began to melt in the latter part of May. By early June almost all the streams and rivers in the Bow Basin had experienced their snowmelt peaks. In most cases, these were the highest flows to be recorded on the streams and rivers in 1983.

May was warm and very dry in the Bow Basin. Precipitation amounts ranged from 21 per cent to 42 per cent of normal for the month. June precipitation amounts were also below normal. Historically, May and June are the months with the most precipitation. This lack of rain, combined with the early snowmelt, had a major impact on streamflows for the rest of the year.

Rivers quickly receded from their early June peaks. During July and August, precipitation in the mountain and foothill portions of the basin ranged from normal to above normal; the plains areas received below normal precipitation. A storm in the upper Bow Basin in July brought the flow up for a brief period. For most of August and September, flows on rivers and streams in the Bow Basin were below normal.

Figures 2 through 9 summarize winter and summer precipitation.

Water Supply Volume Review

Early spring snowpack conditions in the mountains indicated that a normal to slightly below normal water supply situation would exist in the Bow Basin this summer. The lack of precipitation in May and June caused the situation to deteriorate, particularly for the Highwood and Elbow Rivers.

The Bow River at Banff produced 83 percent of its normal May to September flow. The Bow River at Calgary produced 80 percent. The Highwood and Elbow Rivers, produced 65 percent and 49 percent respectively of their normal May to September flows.

The following table compares the volume of flow for the period May 1 1983 to September 30, 1983 (as a percent of normal) with the volume of flow from two recent low flow years.

	1977	1979	1983
Bow/Banff	80%	77%	83%
Bow/Calgary	67%	66%	80%
Elbow River	48%	59%	65%
Highwood River	30%	56%	49%

A detailed summary of 1983 natural flow volumes is presented in Table 1.

Water Storage Review

The low flows on the Bow River caused some difficulties for the irrigation districts and for hydroelectric power operations this summer.

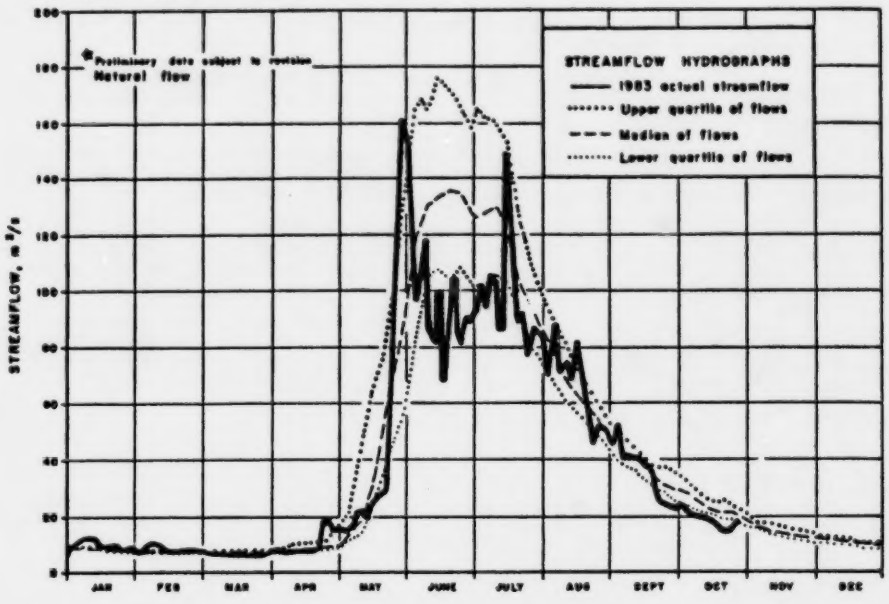
By early August, flows on the Bow River had fallen below the level required to meet the demand for irrigation water, and also allow operators of upstream reservoirs to continue their existing rate of storage. The rate of storage in upstream reservoirs was reduced to make more water available for the Irrigation Districts. This reduced rate of storage meant that hydroelectric reservoirs in the Bow system were slightly below normal as of October 1. This situation will not pose a serious problem with respect to winter flows in the Bow River throught Calgary.

Flows continued to fall off and by the middle of August, the Eastern Irrigation District had to reduce its rate of storage in order to meet irrigation demand. The Bow River Irrigation District decided that this year it would not deliver water for fall irrigation and instead would use the last few weeks of their diversion exclusively for refilling its reservoirs. The E.I.D. continued to divert water throughout October and was able to bring Lake Newell up to 83 percent of full supply. The B.R.I.D. also continued to divert water during October and brought their reservoirs up to normal levels.

The low flows, combined with the high irrigation demand, kept flows on the Bow River below Bassano Dam very low from the latter part of August, to the end of October, one of the longest periods of extended low flow below Bassano Dam in recent history.

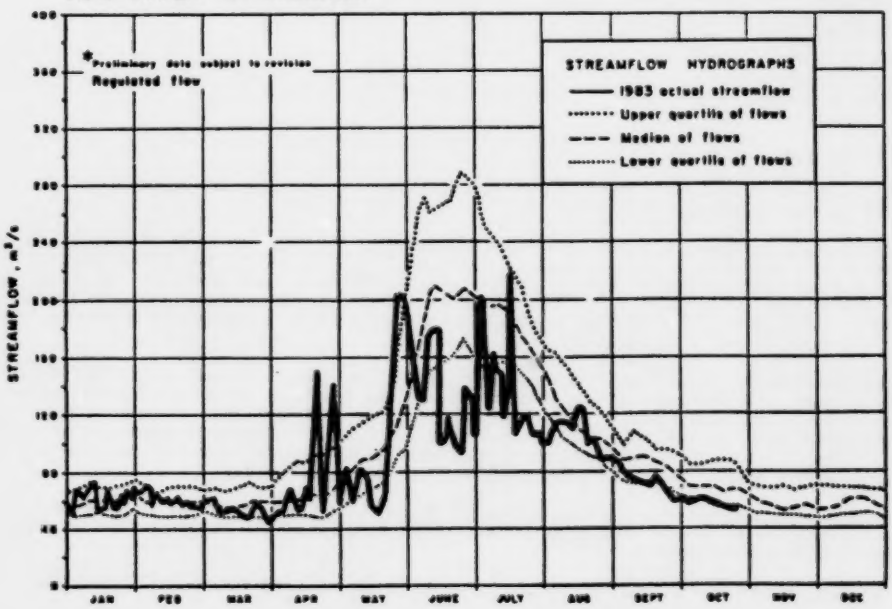
A detailed summary of the water supply storage as of October 1, 1983 is presented in Table 2.

BOW RIVER at BANFF



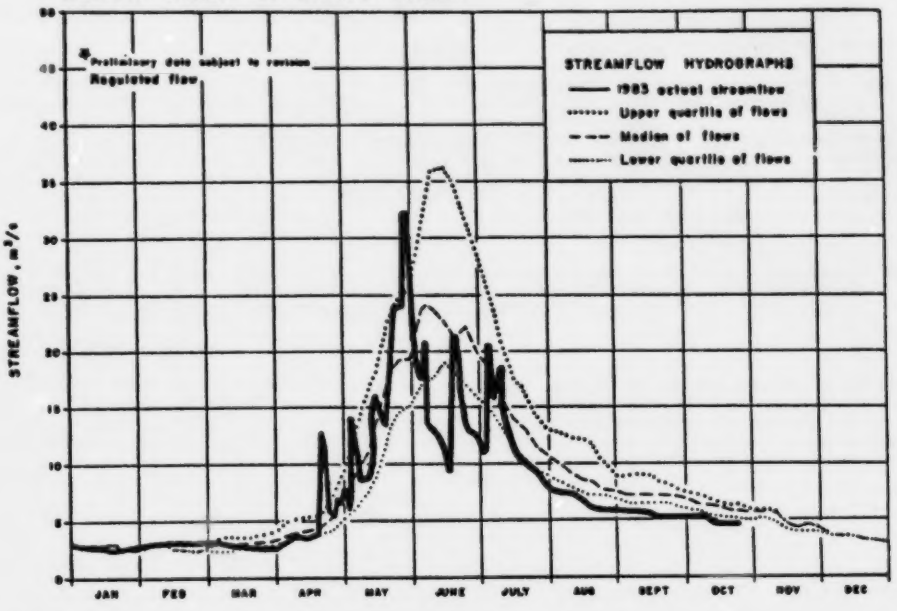
NOTE: Upper quartile, median, and lower quartile of flows based on 1930 - 1979 period of record.

BOW RIVER at CALGARY



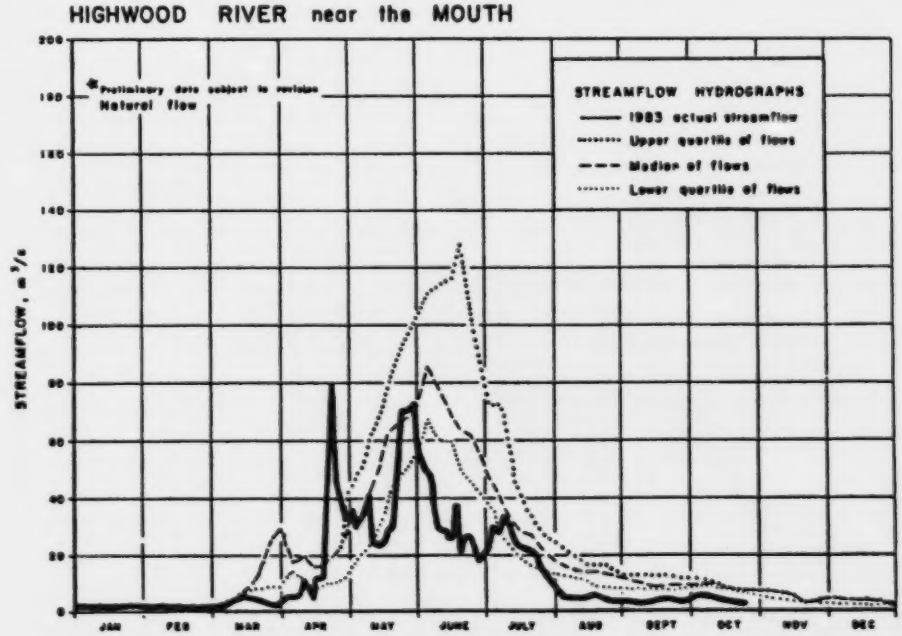
NOTE: Upper quartile, median, and lower quartile of flows based on 1930 - 1979 period of record.

ELBOW RIVER at BRAGG CREEK



NOTE: Upper quartile, median, and lower quartile of flows based on 1950 - 1978 period of record

HIGHWOOD RIVER near the MOUTH



NOTE: Upper quartile, median, and lower quartile of flows based on 1950 - 1978 period of record.

RED DEER RIVER BASIN

Weather, Snowpack and Streamflow Conditions Review

As of March 1 1983, the snowpack in the Red Deer Basin ranged from below normal in the mountains and foothills areas to much below normal in the plains area of the basin. Runoff from the plains area snowmelt peaked during the first week of April. No flooding was reported. Snowstorms in late April brought streamflows up sharply but, only for a brief period, after which flows receded quickly.

During the latter half of May, warm weather melted most of the snow in the mountains. Peak flows from the mountain snowmelt were recorded during the last week of May. Streamflow quickly receded during June.

Precipitation for the period May 1 to Sept 30 in the Red Deer Basin was much below average, despite a major July storm.

Streamflow conditions at the City of Red Deer were much below normal during June because most of the flow was being used to fill the Dickson Reservoir. July flows were close to natural flow values while August and September flows were slightly below natural flow values.

Water Supply Volume Review

Based on March 1, 1983 snowpack conditions, the water supply from the Red Deer Basin was expected to be much below normal during the summer of 1983. The water supply outlook improved slightly in April but deteriorated in May and June as a result of below average precipitation. Fortunately, above normal precipitation occurred in July, boosting the flow in all major rivers in the basin. Based on tentative hydrometric records, calculated total natural flow for the months of April through September for the Red Deer River at Red Deer was only 70 percent of normal.

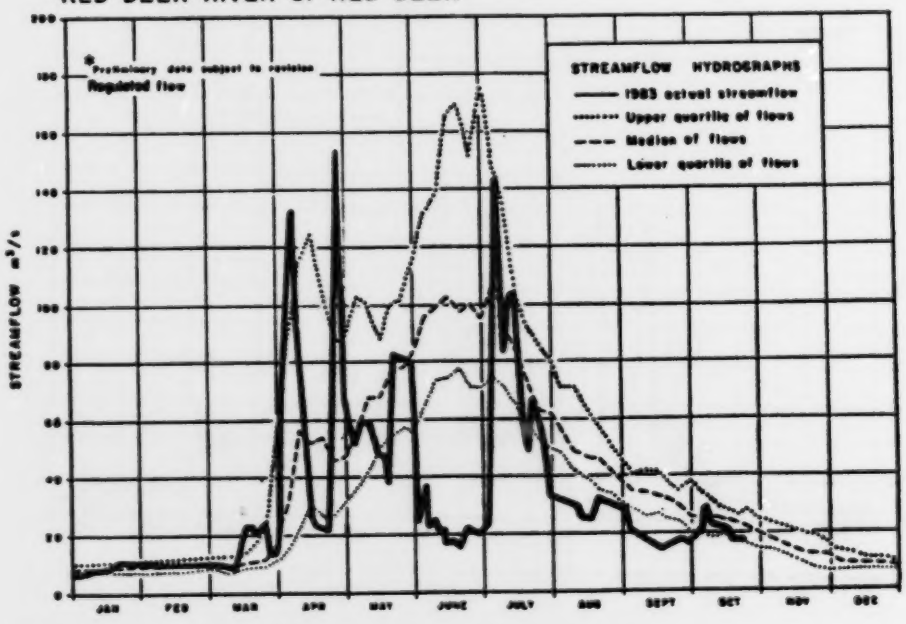
Table 1 is a summary of the actual water supply conditions for 1983.

Water Storage Situation

As of March 1, 1983 no problems were anticipated in filling Dickson Reservoir despite a forecast of below normal runoff.

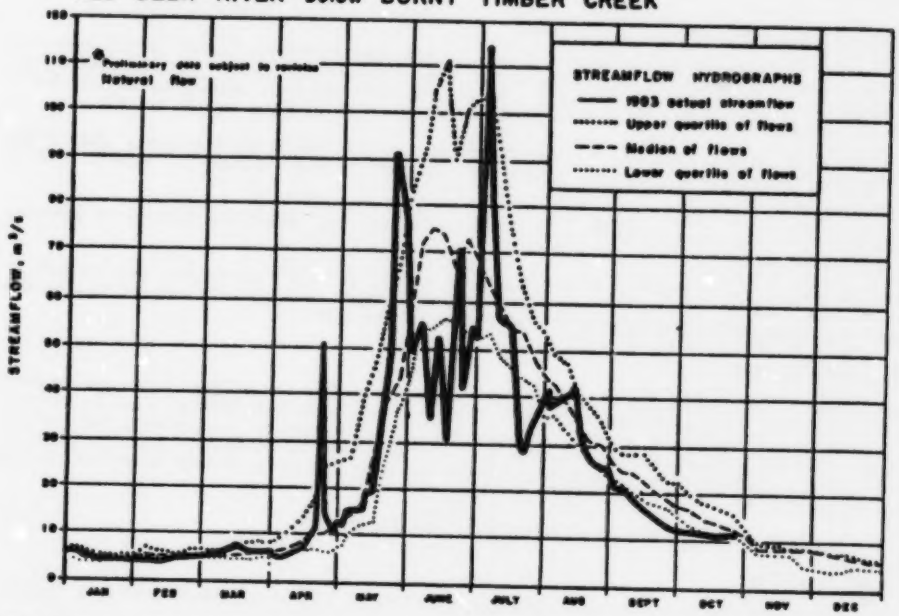
Filling of the Dickson Reservoir proceeded as planned. As of May 1 the reservoir was 7 percent full. During May, most of the inflow was passed through the reservoir. Enough water was stored to bring the reservoir to 20 percent of full supply level. June was the main month for filling. Most of the inflow except for minimum downstream requirements went into storage, bringing the reservoir to the 75 percent full mark by the end of the month. High inflow during July was passed, to prevent a rapid increase in reservoir level during the first year of operation. Slow controlled filling continued with the full supply level being reached by mid-September.

RED DEER RIVER at RED DEER



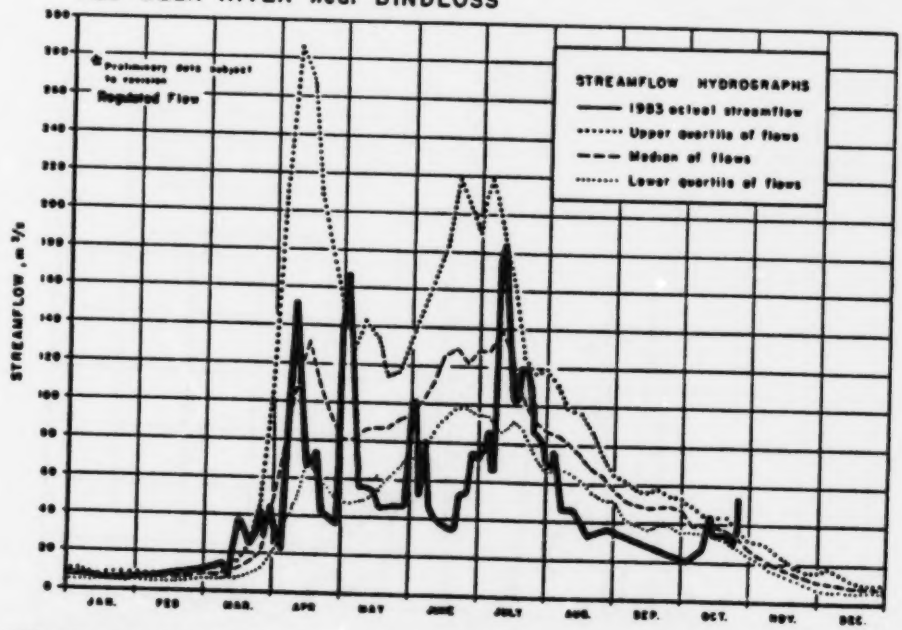
NOTE: Upper quartile, median, and lower quartile of flows based on 1958 - 1978 period of record.

RED DEER RIVER below BURNT TIMBER CREEK



NOTE: Upper quartile, median, and lower quartile of flows based on 1930 - 1979 period of record.

RED DEER RIVER near BINDLOSS



NOTE: Upper quartile, median, and lower quartile of flows based on 1930 - 1979 period of record.

NORTH SASKATCHEWAN RIVER BASIN

Weather Snowpack and Streamflow Conditions Review

As of March 1, 1983 the snowpack in both the plains and headwater areas was well below average. Precipitation for the winter was much below average; this was coupled with the fact that much of the snowpack in the plains area had been depleted by the mild winter temperatures.

Precipitation for March was near normal for the plains area but the mountains and foothills received below average precipitation. April followed much the same trend with below average precipitation except for the Nordegg-Rocky Mountain House areas which had above normal precipitation. Precipitation in May was much below average throughout the basin. Total accumulated precipitation was given a slight boost in June when most areas of the basins received normal to above normal precipitation. July's precipitation was split with the area north of the river receiving below normal precipitation while the area south of the North Saskatchewan received above normal precipitation.

Due to the low winter snowpack and the below normal spring and summer precipitation, natural flow was only 75 percent of normal for June and 84 percent of normal for July. River flow continued to be below normal for the remainder of the summer and fall as flows below the Bighorn and Brazeau Dams were reduced to allow for normal filling of the reservoirs.

Winter and summer precipitation for the North Saskatchewan Basin are presented in Figures 2 through 9.

Water Supply Volume Forecast

Based on March 1, 1983 snowpack conditions in the North Saskatchewan River Basin, water supply was expected to be below normal for all areas of the basin.

Spring runoff from the plains was below normal. Low mountain snowpacks coupled with below normal spring and summer precipitation for the entire period also produced below normal runoff from the mountains and foothills.

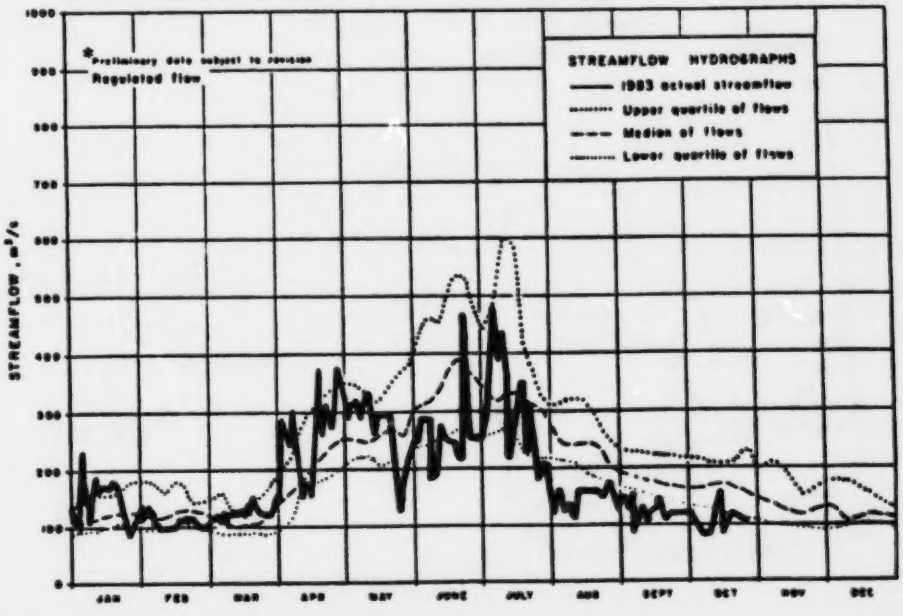
Natural flow for the April 1 to September 30 period was 75 percent of normal. See Table 1 for the 1983 water supply summary.

Water Storage Situation

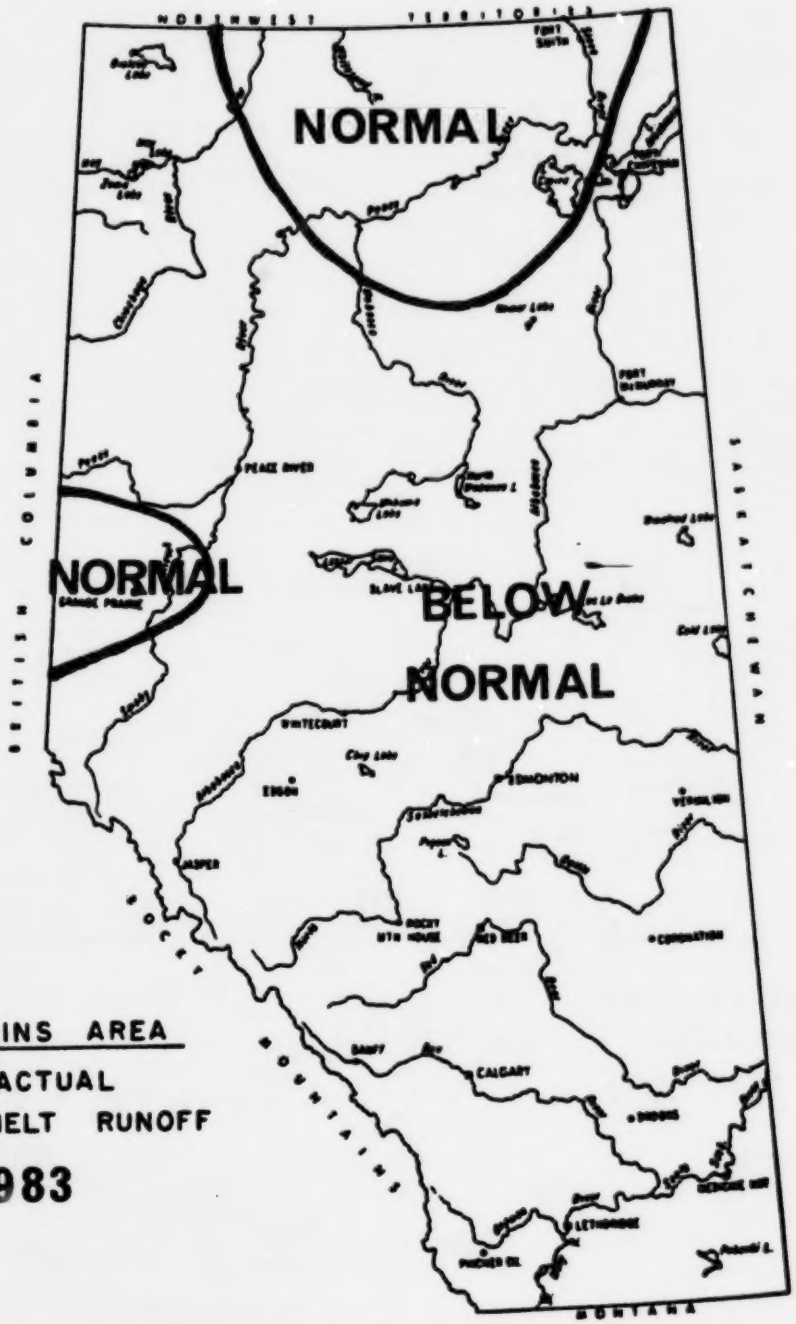
Despite below normal runoff, the Brazeau and Bighorn Reservoirs were both able to fill to normal levels. As of October 1, Lake Abraham and Brazeau Reservoir were 87 and 91 percent of full supply level respectively. The reservoirs were filled at the expense of below average releases throughout the summer. This is evident in the following hydrograph for the North Saskatchewan River at Edmonton.

Table 2 shows the water storage situation as of October 1, 1983.

NORTH SASKATCHEWAN RIVER at EDMONTON



NOTE: Upper quartile, median, and lower quartile of flows based on 1958 - 1979 period of record.



PLAINS AREA

ACTUAL

SNOWMELT RUNOFF

1983

NOTE : THIS FIGURE DOES NOT REFLECT MOUNTAIN RUNOFF CONDITIONS

FIGURE 1

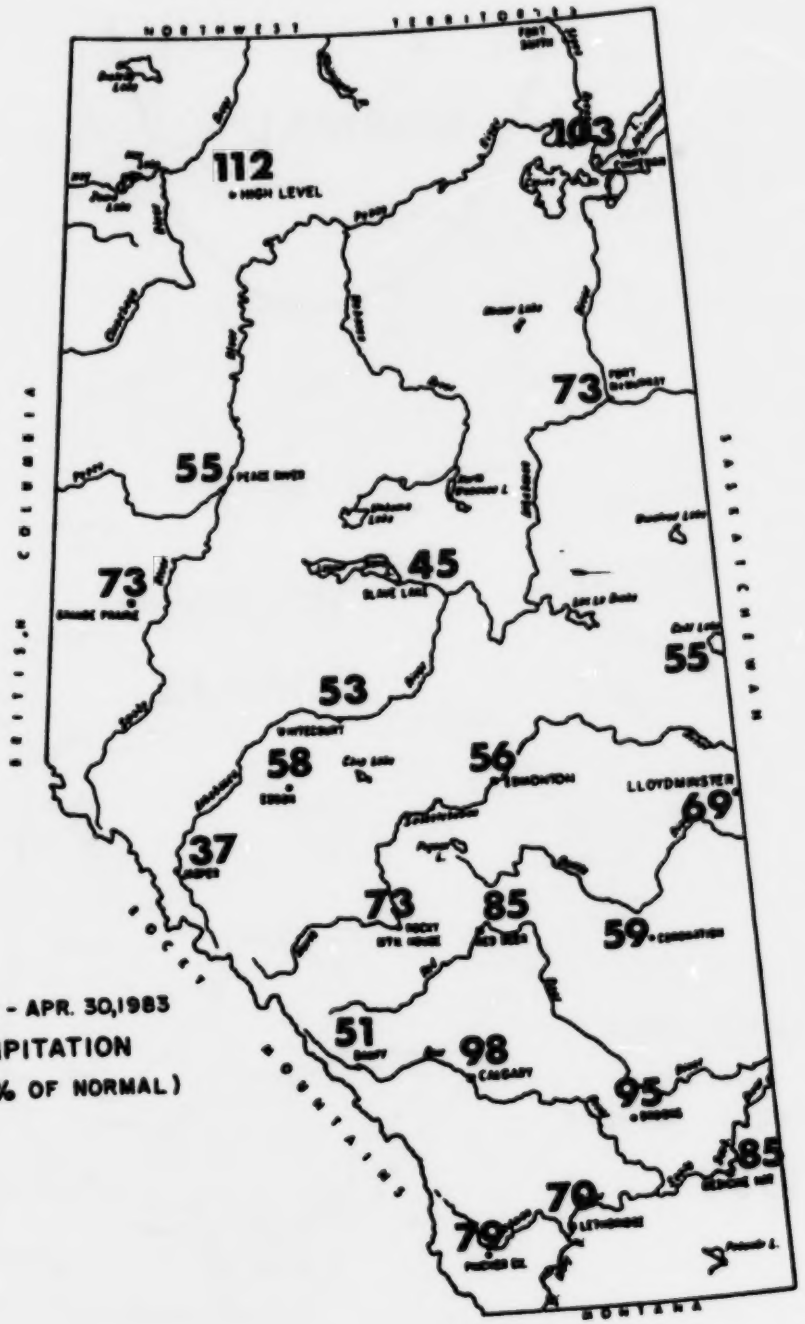

NORTHWEST TERRITORIES
103
112
HIGH LEVEL
73
55
PEACE RIVER
45
BLAIR LAKE
73
55
53
58
56
EDMONTON
LLOYDMINSTER
69
37
73
85
59
51
98
CALGARY
95
85
79
79
LETHBRIDGE
MONTANA
BRITISH COLUMBIA
SASKATCHEWAN
NOV. 1, 1982 - APR. 30, 1983
PRECIPITATION
(AS A % OF NORMAL)

FIGURE 2

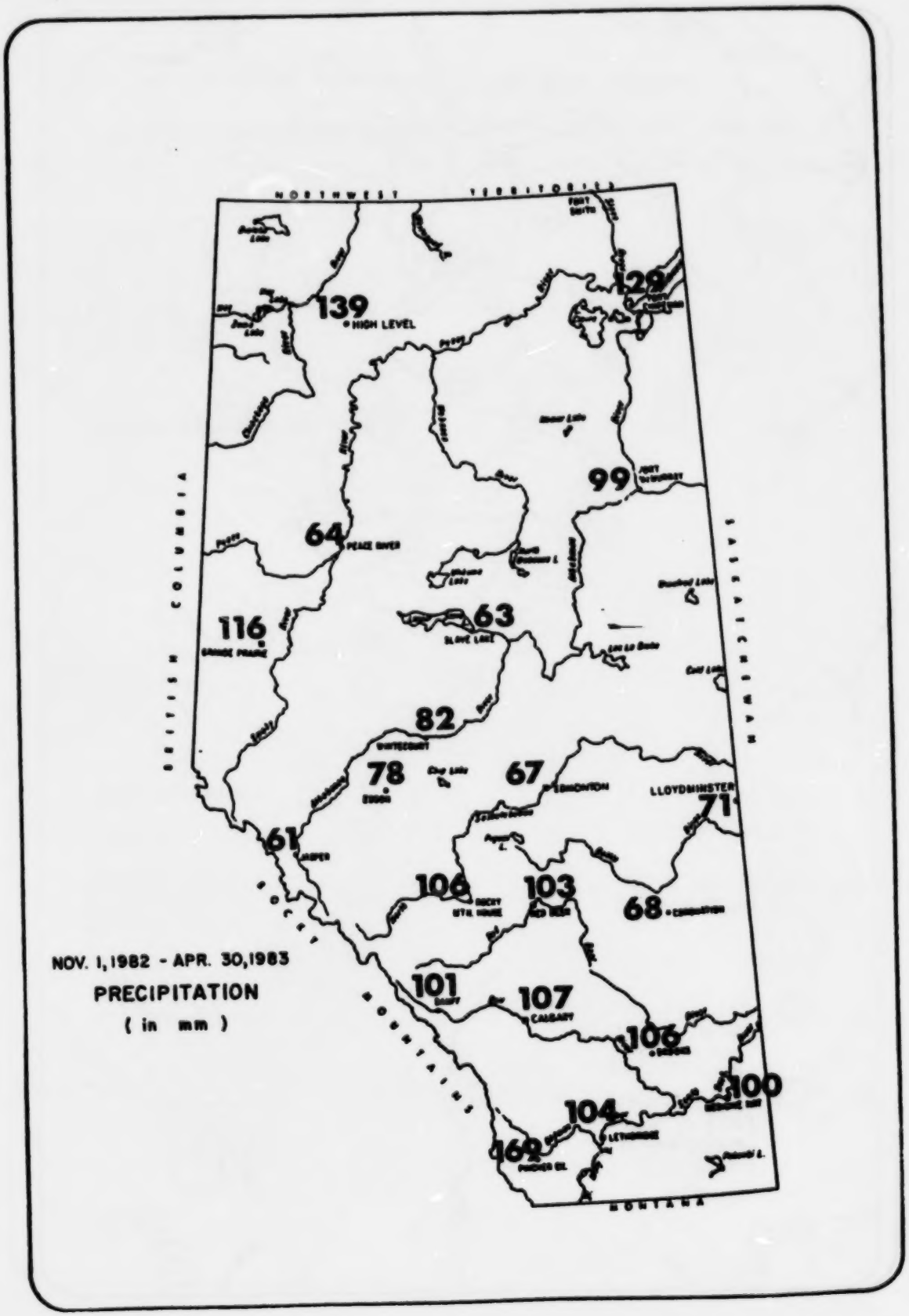

NORTHWEST TERRITORIES
139
HIGH LEVEL
129
99
64
PEACE RIVER
63
SLAVE LAKE
116
82
78
67
EDMONTON
LLOYDMINSTER
71
61
106
103
68
101
107
CALGARY
100
104
LETHBRIDGE
MONTANA
NOV. 1, 1982 - APR. 30, 1983
PRECIPITATION
(in mm)

FIGURE 3

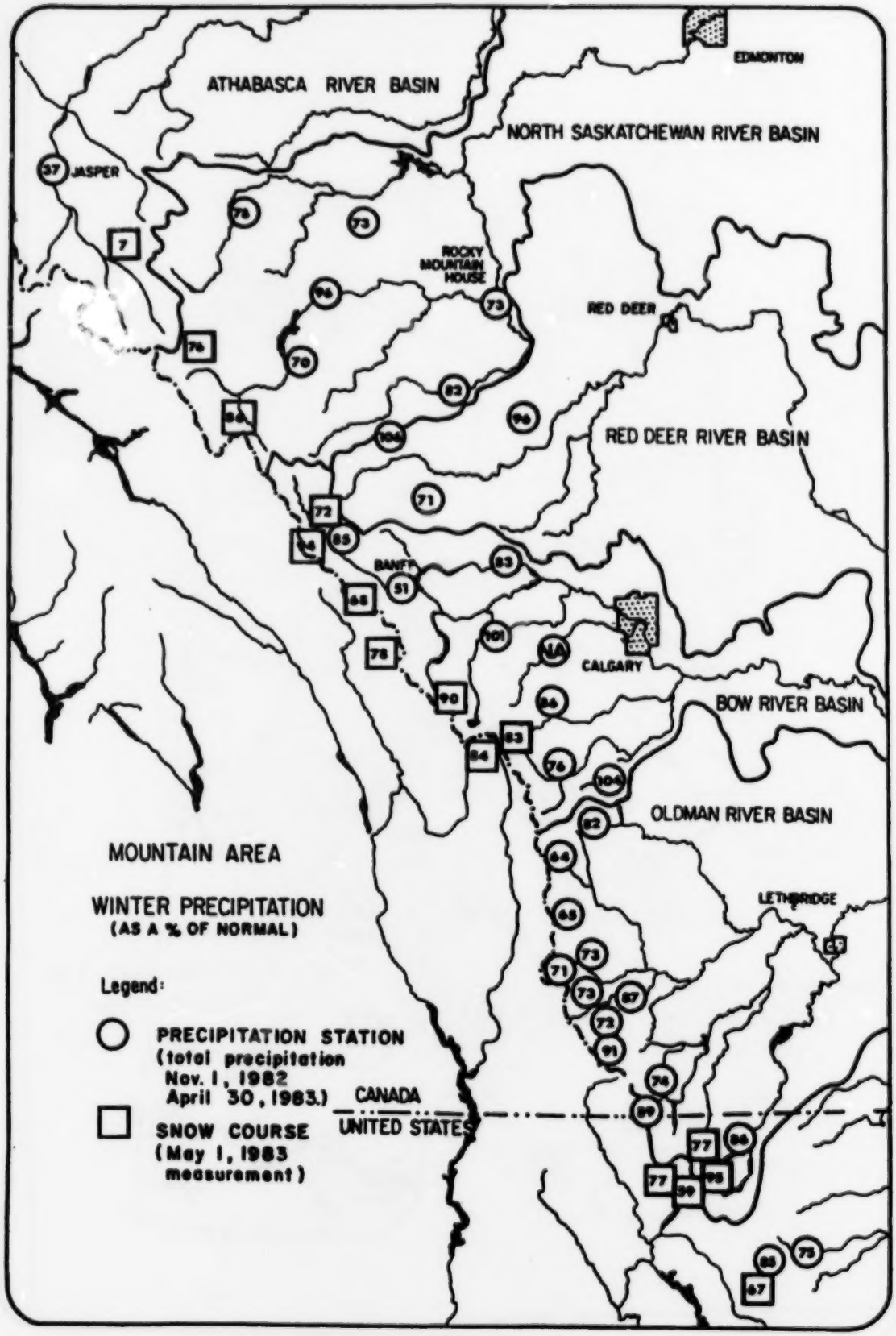

ATHABASCA RIVER BASIN
NORTH SASKATCHEWAN RIVER BASIN
EDMONTON
JASPER
ROCKY MOUNTAIN HOUSE
RED DEER
RED DEER RIVER BASIN
BANFF
CALGARY
BOW RIVER BASIN
OLDMAN RIVER BASIN
LETHBRIDGE
MOUNTAIN AREA
WINTER PRECIPITATION
(AS A % OF NORMAL)
Legend:
PRECIPITATION STATION
(total precipitation
Nov. 1, 1982
April 30, 1983.)
SNOW COURSE
(May 1, 1983
measurement)
CANADA
UNITED STATES

FIGURE 4

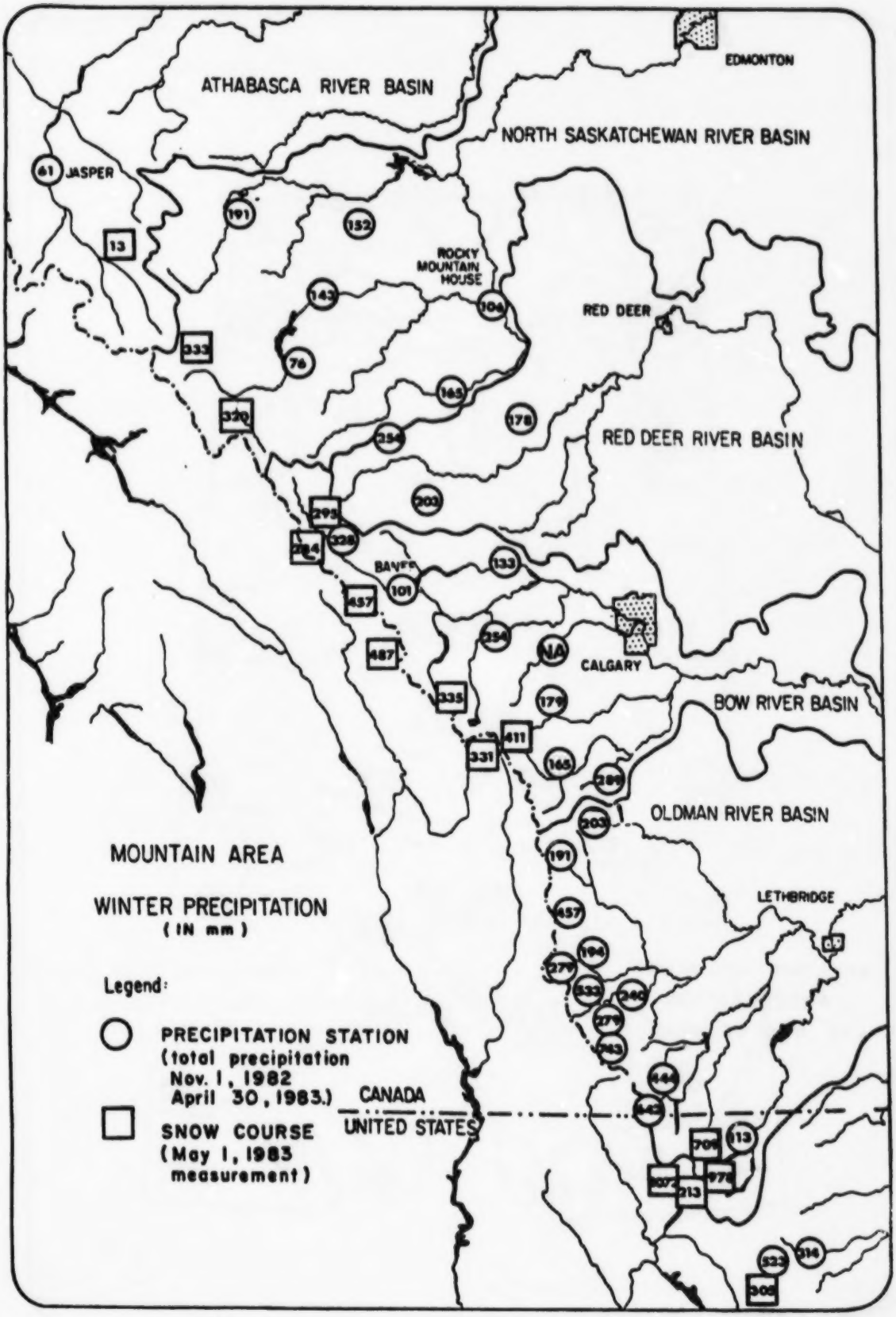

ATHABASCA RIVER BASIN
NORTH SASKATCHEWAN RIVER BASIN
EDMONTON
JASPER
ROCKY MOUNTAIN HOUSE
RED DEER
RED DEER RIVER BASIN
BANFF
CALGARY
BOW RIVER BASIN
OLDMAN RIVER BASIN
LETHBRIDGE
MOUNTAIN AREA
WINTER PRECIPITATION
(IN mm)
Legend:
PRECIPITATION STATION
(total precipitation
Nov. 1, 1982
April 30, 1983.)
SNOW COURSE
(May 1, 1983
measurement)
CANADA
UNITED STATES

FIGURE 5

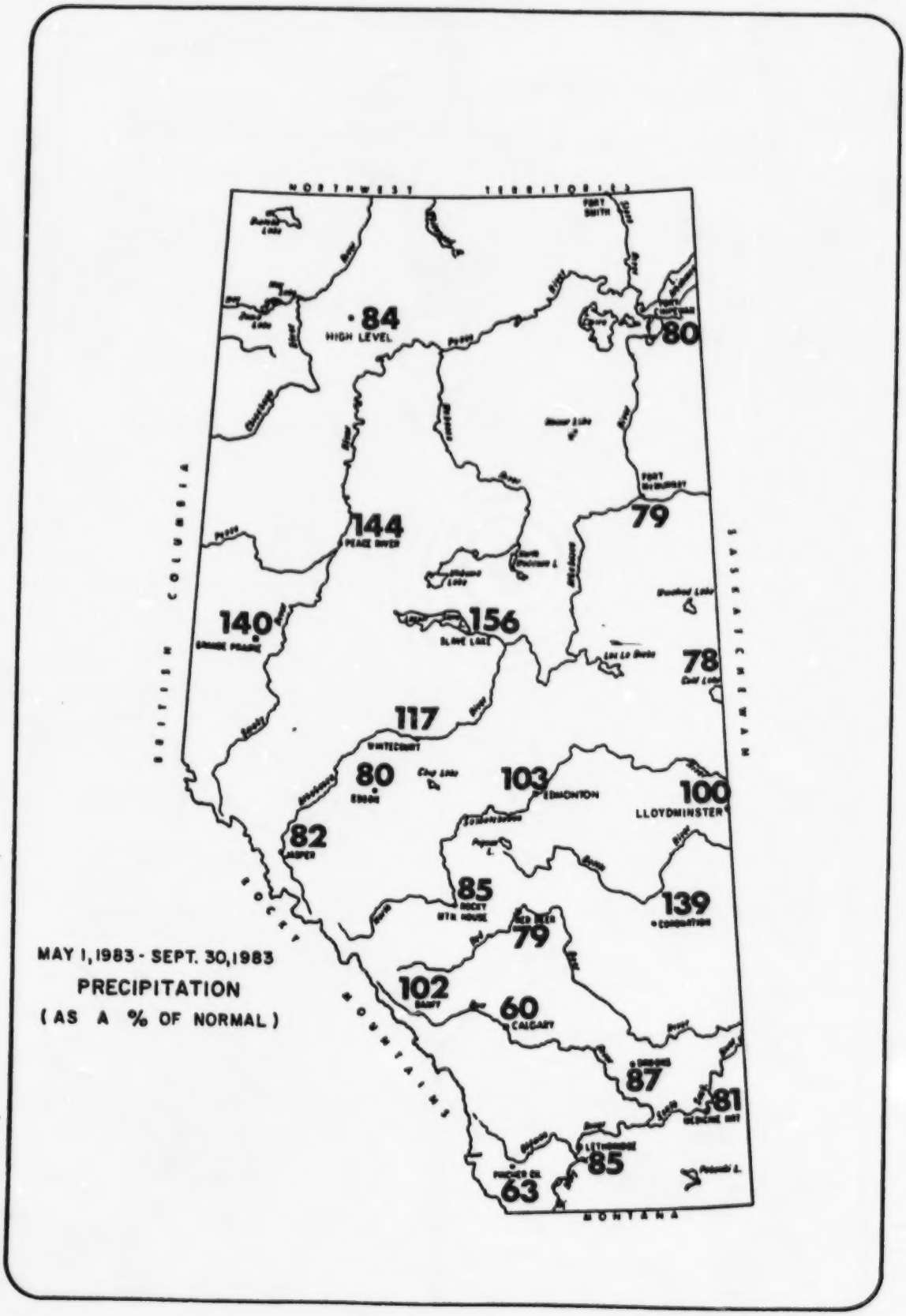

NORTHWEST TERRITORIES
SASKATCHEWAN
BRITISH COLUMBIA
ROCKY MOUNTAINS
MONTANA
84
HIGH LEVEL
80
144
PEACE RIVER
79
140
156
78
117
WHITECOURT
80
EDSON
103
EDMONTON
100
LLOYDMINSTER
82
JASPER
85
ROCKY MTN. HOUSE
139
79
102
60
CALGARY
87
81
85
63
MAY 1, 1983 - SEPT. 30, 1983
PRECIPITATION
(AS A % OF NORMAL)

FIGURE 6

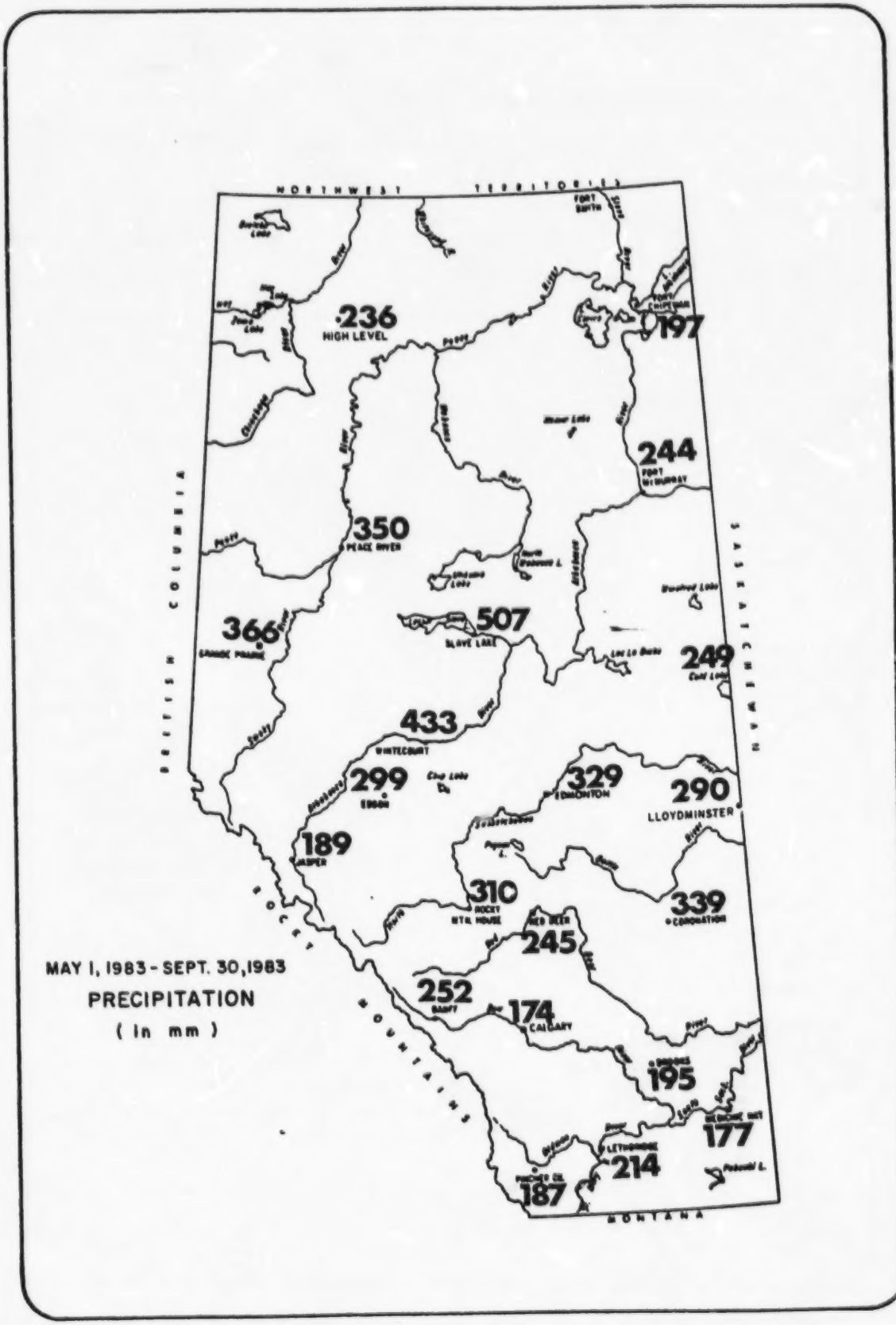

NORTHWEST TERRITORIES
236
HIGH LEVEL
197
244
350
PEACE RIVER
366
507
249
433
WHITECOURT
299
EDSON
329
EDMONTON
290
LLOYDMINSTER
189
JASPER
310
ROCKY MTN. HOUSE
339
CORONATION
245
252
174
CALGARY
195
177
214
187
BRITISH COLUMBIA
SASKATCHEWAN
ROCKY MOUNTAINS
MONTANA
MAY 1, 1983 - SEPT. 30, 1983
PRECIPITATION
(in mm)

FIGURE 7

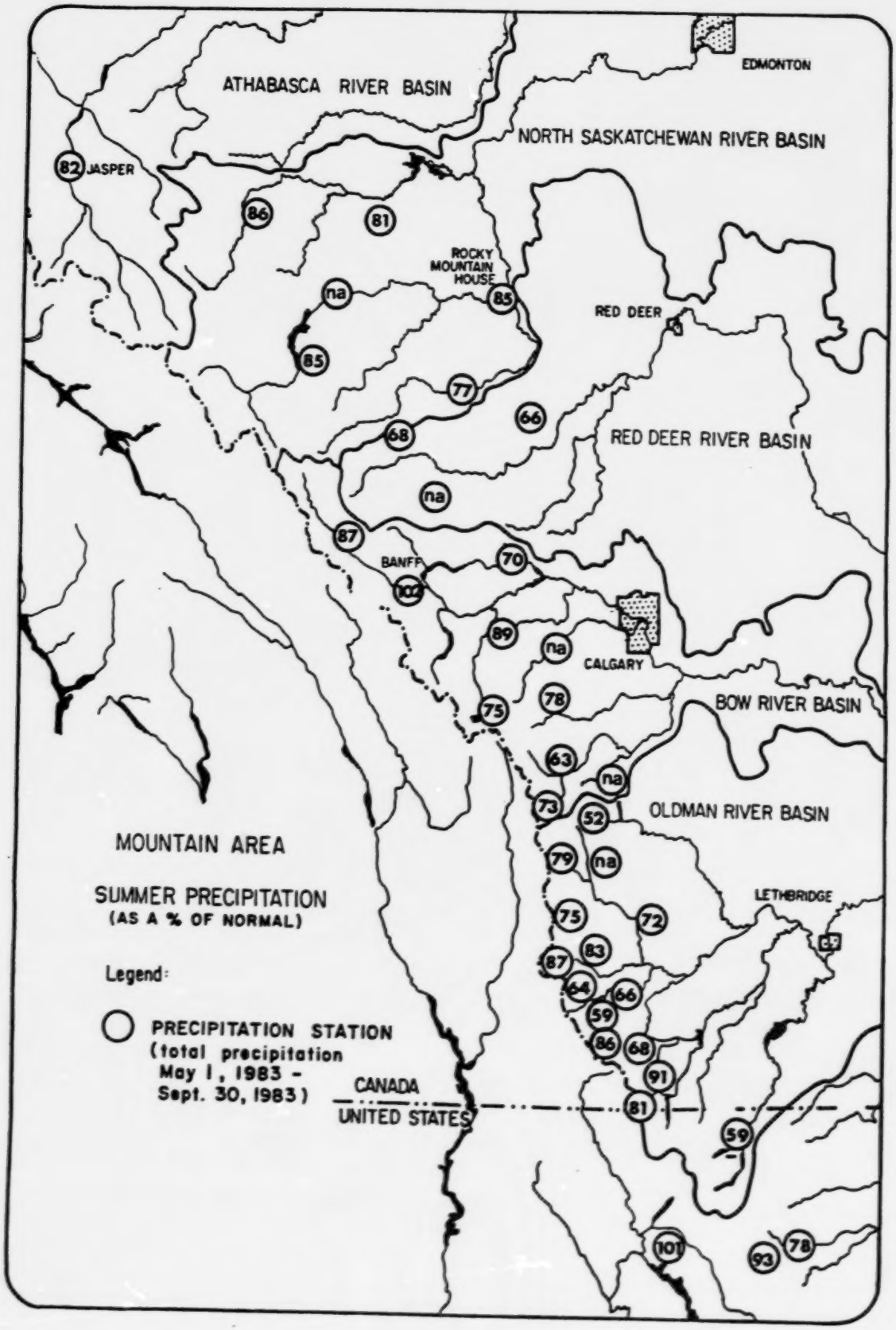

ATHABASCA RIVER BASIN
EDMONTON
NORTH SASKATCHEWAN RIVER BASIN
82 JASPER
86
81
ROCKY MOUNTAIN HOUSE
na
85
RED DEER
85
77
66
68
RED DEER RIVER BASIN
na
87
BANFF
70
102
89
na
CALGARY
78
75
BOW RIVER BASIN
63
na
73
52
OLDMAN RIVER BASIN
79
na
LETHBRIDGE
75
72
83
87
64
66
59
86
68
91
81
59
101
93
78
MOUNTAIN AREA
SUMMER PRECIPITATION
(AS A % OF NORMAL)
Legend:
PRECIPITATION STATION
(total precipitation
May 1, 1983 -
Sept. 30, 1983)
CANADA
UNITED STATES

FIGURE 8

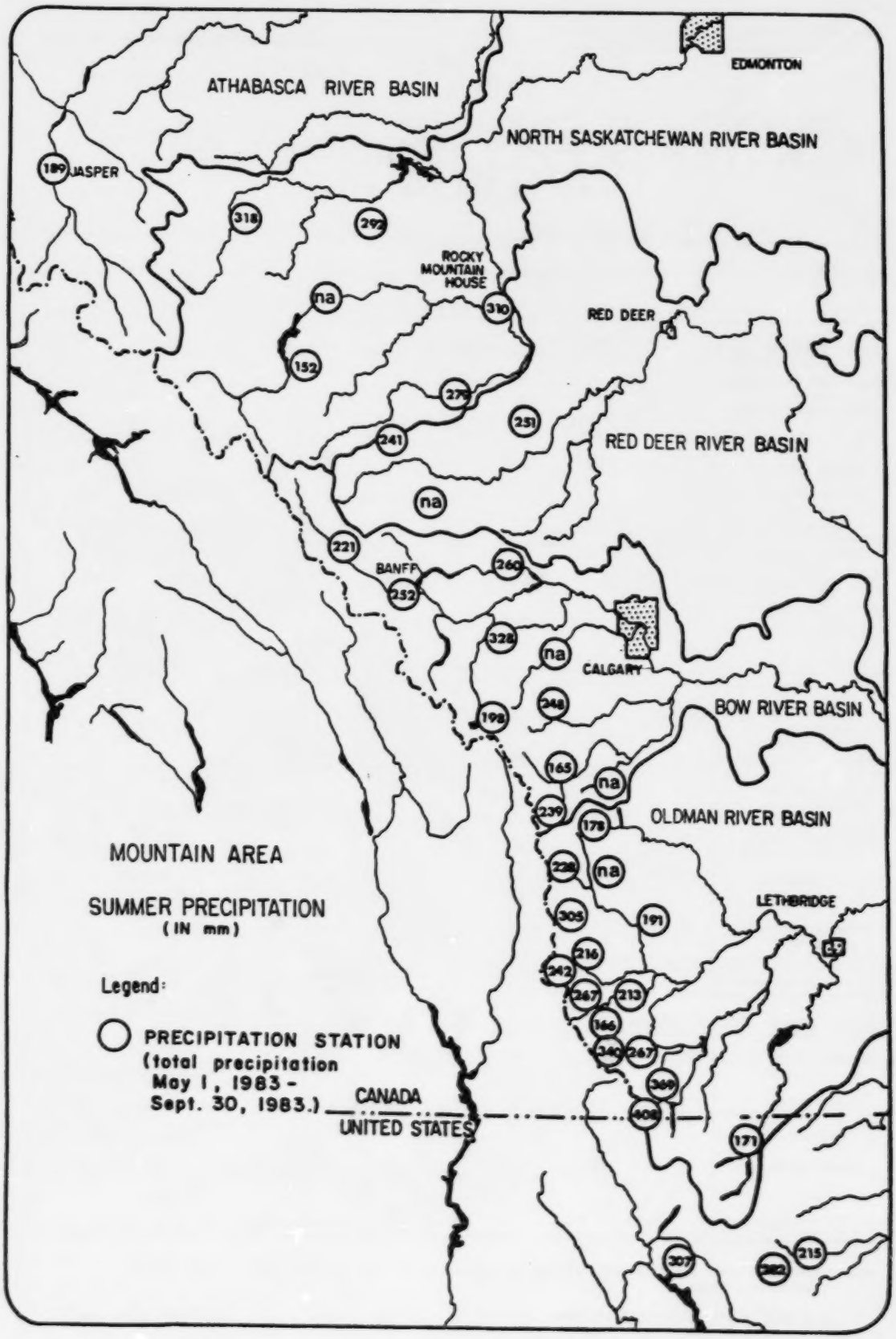

ATHABASCA RIVER BASIN
EDMONTON
NORTH SASKATCHEWAN RIVER BASIN
189
JASPER
318
292
ROCKY MOUNTAIN HOUSE
na
310
RED DEER
152
279
251
241
RED DEER RIVER BASIN
na
221
BANFF
260
232
328
na
CALGARY
198
248
BOW RIVER BASIN
165
na
239
178
OLDMAN RIVER BASIN
MOUNTAIN AREA
SUMMER PRECIPITATION
(IN mm)
228
na
LETHBRIDGE
305
191
216
242
247
213
Legend:
246
240
247
PRECIPITATION STATION
(total precipitation
May 1, 1983 -
Sept. 30, 1983.)
369
CANADA
UNITED STATES
171
307
215

FIGURE 9

TABLE I

WATER SUPPLY SUMMARY 1983

	Total Runoff ($10^6 m^3$)*	(% of Normal)
BOW RIVER BASIN	**May 1 to Sept. 30 Runoff**	
Bow River at Banff	870	83
Bow River at Calgary	1830	80
Elbow River	136	65
Highwood River	308	49
NORTH SASK. RIVER BASIN	**Apr. 1 to Sept. 30 Runoff**	
North Saskatchewan River at Edmonton	4500	75
OLDMAN RIVER BASIN	**Apr. 1 to Sept. 30 Runoff**	
St. Mary River at International Boundary	502	74
Belly River near Mountain View	191	78
Waterton River at Waterton Park	363	74
Oldman River near Fort McLeod	659	59
Oldman River near Lethbridge	1900	64
RED DEER RIVER BASIN	**Apr. 1 to Sept. 30 Runoff**	
Red Deer River at Red Deer	906	70

NOTE: Forecasts shown are total natural flow volumes computed from recorded flow data and current reservoir storage.

$1 \times 10^6 m^3$ = 811 ac-ft = 409 cfs days

TABLE 2

MAJOR WATER STORAGE RESERVOIRS IN ALBERTA

STATUS AS OF OCT. 1, 1983

	LIVE STORAGE ($10^6 m^3$)		PERCENT OF MAXIMUM LIVE STORAGE	REMARKS
BOW RIVER BASIN	October 1 1983	October 1 1982	October 1 1983	
Lake Minnewanka	188	207	85	Below Normal
Lower Kananaskis Lake	52	55	83	Below Normal
Upper Kananaskis Lake	107	116	86	Below Normal
Spray Lake	233	251	87	Below Normal
TOTAL	580	629		
Lake McGregor	252	287	78	Below Normal
Travers Reservoir	75	83	71	Below Normal
TOTAL	327	360		
Lake Newell	113	140	63	Below Normal
NORTH SASKATCHEWAN RIVER BASIN	October 1 1983	October 1 1982	October 1 1983	
Lake Abraham	1229	1321	87	Normal
Brazeau Reservoir	441	473	91	Normal
TOTAL	1670	1794		
OLDMAN RIVER BASIN	October 1 1983	October 1 1982	October 1 1983	
St. Mary Reservoir	201	340	54	Normal
Waterton Reservoir	55	58	48	Below Normal
Ridge Reservoir	83	14	65	Below Normal
Chin Reservoir	176	161	85	Above Normal
TOTAL	515	573		

NOTE: 1 x $10^6 m^3$ = 811 ac-ft = 409 cfs days

APPENDIX A

SNOW SURVEY
AND
STORAGE GAUGE DATA

SNOW SURVEY ACTIVITIES

In 1982 - 1983 Alberta Environment operated thirty five snow courses in the mountainous areas of the Province and sixty four in the plains. The following tables contain a summary of all the data collected at these sites in the winter of 1982 - 1983 as well as information on the location of each course.

The main purpose of the snow network is to provided data to the River Forecast Centre to enable them to produce the Water Supply Outlook and make flood forecasts when necessary. For this reason the snow data are included in the Water Supply Outlook which are issued on March 1st, April 1st, May 1st and June 1st. In addition the data will be published along with snow data from our Provinces, by the Atmospheric Environment Service, in their annual publication, Snow Cover Data for Canada.

An historical summary containing all data collected in previous years at the snow courses included in this report is available upon request. This summary also includes data from discontinued snow courses. It should be noted that the snow courses are measured at approximately the same date every year. If the measurement cannot be carried out either six days before or six days after the first day of the month, they are not included in the summary.

In addition to the snow courses, data were collected from thirteen snow pillows in 1982 - 1983. Seven of these pillows were equipped to give data on a real time basis. The primary purpose of snow pillows is to provide an indication of the snow melt rate at higher elevations. On page A11 is a list of all snow pillows operated in 1982 - 1983 as well as graphs from the pillows which operated satisfactorily. The graphs indicate the accumulation and depletion of the water equivalent of the snow pack over the winter. Also shown for comparison purposes are the results of snow surveys carried out by conventional methods at adjacent snow courses.

In 1982 - 1983 three new snow courses were established and two were discontinued.

Following are details on these changes.

NEW COURSES	Approximate Location Latitude	Longtitude	Elevation Metres	River Basin
Limestone Snow Pillow	51° 54'	115° 26'	1950	N. Sask
Race Horse Snow Pillow	49° 49'	114° 49'	1920	Oldman
DISCONTINUED COURSES				
Lee Creek H	48° 58'	113° 32'	1650	Oldman
Lee Creek J	48° 59'	113° 36'	1650	Oldman

For further information on snow data, please contact.

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Technical Services Division
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9820 - 106 Street
Edmonton, Alberta
T5K 2J6

Telephone Number: 427 - 6279

ALBERTA SNOW COURSE DATA
MOUNTAIN AREA

Station Name	Elevation (metres)	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
				1983	1982	Prior to 1983 Max.	Min.	Ave.	
ATHABASCA RIVER BASIN									
Marmot-Jasper	1830	03-01	59	115	185	208	185	195	4
		03-28	70	163	213	422	152	259	14
		04-28	42	152	239	401	0	237	14
Sunwapta Falls	1400	02-02	48	94	84	183	84	137	13
		03-01	54	102	175	277	79	176	12
		03-29	54	130	193	333	89	208	15
		04-28	6	13	199	340	0	174	14
BOW RIVER BASIN									
Bow River	1580	01-31	69	152	130	262	79	172	17
		03-01	74	183	206	386	112	209	17
		03-28	81	206	234	437	97	212	47
Bow Summit II	2080	02-02	96	226	178	292	178	251	4
		03-01	115	295	277	368	277	339	6
		03-30	119	340	353	434	353	382	5
		04-27	93	320	396	439	305	370	5
		06-01	0	0	262	262	160	211	3
Chateau Lawn	1740	01-31	85	191	152	284	122	221	15
		03-01	98	241	221	401	155	261	15
		03-28	102	277	300	480	135	276	42
Cut Head Lake	2210	03-02	101	249	279	279	279	279	2
		03-30	110	302	389	490	389	426	5
		04-27	114	318	465	485	350	431	5
		05-25	60	236	391	404	56	284	5
Highwood Summit	2210	02-01	99	251	183	439	132	281	10
		03-03	107	297	241	439	241	346	12
		03-29	110	325	305	681	259	400	14
		04-26	155	411	478	726	221	497	20
		05-31	51	216	373	455	373	414	3
Katherine Lake	2380	03-30	123	373	N/A	521	371	446	3
		04-27	112	284	541	541	500	521	3
		06-01	N/A	N/A	554	554	363	434	4
Larch Valley	2230	03-02	130	368	399	399	399	399	2
		03-30	146	409	N/A	475	424	457	4
		04-27	125	424	546	546	424	497	5
		06-01	67	272	483	483	363	410	4
Little Elbow Summit*	2225	02-01	87	185	145	249	122	182	5
		03-03	101	262	221	257	218	238	5
		03-29	98	272	287	348	279	304	5
		04-26	157	394	384	384	259	329	5
		05-31	57	208	292	373	292	333	3
Mirror Lake	2030	02-03	77	185	142	348	109	219	17
		03-01	90	229	213	483	142	261	17
		03-30	98	284	295	561	160	301	44

* Snow pillow data also available at these sites.

Station Name	Elevation (metres)	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
				1983	1982	Prior to 1983 Max.	Min.	Ave.	
BOW RIVER BASIN (CONT'D)									
Mist Creek	1790	03-29	73	203	249	302	140	207	7
		04-26	64	178	234	523	0	200	18
Mud Lake	1910	02-01	97	236	213	216	213	215	3
		03-03	101	252	295	295	240	268	3
		03-29	101	297	424	424	269	336	6
		04-26	119	335	480	551	206	371	11
		05-31	0	0	272	272	272	272	2
Pipestone, Upper	1615	01-31	82	173	135	279	89	167	17
		02-28	73	183	234	376	107	219	17
		03-28	88	229	284	434	109	203	47
Ptarmigan Hut	2180	03-02	110	292	325	564	213	347	15
		03-30	116	328	422	681	254	422	17
		04-27	84	295	445	568	196	407	17
		06-01	0	0	318	318	249	284	3
Skoki Mountain*	2060	03-02	103	280	287	287	287	287	2
		03-30	112	302	366	396	318	362	5
		04-27	105	328	414	414	333	374	5
		06-01	0	0	358	358	48	272	5
Sunshine Village*	2230	02-03	125	333	381	447	323	386	6
		03-04	149	406	516	770	277	504	14
		03-31	160	513	658	996	406	647	17
		04-25	145	457	729	1092	338	669	17
		06-01	65	295	627	627	203	434	5
Tent Ridge	2020	02-01	98	244	188	259	188	230	3
		03-01	N/A	N/A	292	300	292	296	2
		03-29	108	320	389	389	320	348	3
		04-26	138	376	498	498	345	406	3
		05-31	0	0	376	376	0	125	3
Three Isle Lake	2160	02-01	134	358	371	371	371	371	2
		03-03	145	445	N/A	531	531	531	2
		03-29	158	503	653	653	559	606	3
		04-26	173	579	737	737	620	679	3
		05-31	80	345	673	673	587	630	3
NORTH SASKATCHEWAN RIVER BASIN									
Limestone Mtn.*	1950	01-27	40	62	N/A	N/A	N/A	N/A	1
		03-29	51	91	N/A	N/A	N/A	N/A	1
		05-04	42	127	N/A	N/A	N/A	N/A	1
Nigel Creek	1920	02-02	89	229	191	528	173	284	13
		03-02	111	280	355	655	185	373	12
		03-29	112	333	389	686	198	431	15
		04-28	89	333	406	752	208	440	14
OLDMAN RIVER BASIN									
Akamina*	1800	02-02	122	384	N/A	338	295	317	3
		03-02	141	455	472	472	396	424	4
		03-28	140	505	663	663	432	553	4
		04-26	117	475	691	691	320	461	4
		05-31	0	0	378	378	378	378	2
Allison Pass	1980	01-28	106	310	259	259	259	259	2
		03-01	122	350	440	566	251	452	4
		03-31	126	399	577	823	302	510	20
		04-26	117	384	617	617	511	564	3
Lee Creek Watershed D	1660	02-28	35	117	122	444	81	198	10
		03-29	35	119	216	615	117	247	9

* Snow pillow data also available at these sites

Station Name	Elevation (metres)	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
				1983	1982	Prior to 1983 Max.	Min.	Ave.	
OLDMAN RIVER BASIN (CONT'D)									
Lee Creek Watershed E	1675	02-28	47	152	203	267	91	183	6
		03-29	54	165	183	536	183	296	7
Lee Creek Watershed F	1570	02-28	30	97	142	231	99	165	8
		03-29	30	99	203	356	60	206	9
Lee Creek Watershed P	1525	02-28	26	91	89	366	84	178	10
		03-29	29	104	155	358	61	187	11
Lee Creek Watershed Q	1500	02-28	35	107	114	320	97	172	13
		03-29	45	157	201	315	94	185	12
Middle Drywood	1570	03-30	19	69	74	97	0	48	19
Race Horse Creek	1920	01-28	109	338	N/A	N/A	N/A	N/A	1
		03-01	139	447	N/A	N/A	N/A	N/A	1
		04-26	137	508	N/A	N/A	N/A	N/A	1
		05-31	23	94	N/A	N/A	N/A	N/A	1
West Castle (Bush)	1520	02-03	114	343	236	236	236	236	2
		03-03	120	391	429	429	277	353	3
		03-31	109	396	554	846	244	478	17
		04-26	95	335	533	533	533	533	2
Wilkinson Summit (Bush)	1980	03-30	49	112	173	460	132	228	20
Wilkinson Summit (Open)	1980	03-30	41	94	157	417	112	194	19
RED DEER RIVER BASIN									
Gable Mountain	2150	03-02	60	127	132	132	132	132	2
		03-30	64	132	N/A	216	216	216	2
		04-27	68	175	208	229	208	219	3
		06-01	0	0	97	130	97	114	3
McConnell Creek	2130	03-02	66	145	124	185	124	155	3
		03-30	68	155	180	216	180	198	3
		04-27	52	76	175	198	175	187	3
		06-01	0	0	51	109	51	80	3
ST. MARY RIVER BASIN									
Iceberg Lake Trail **	1705	04-27	137	536	841	1336	0	690	60
Peigan Pass **	1675	04-26	210	937	1242	1671	145	930	60
Mt. Allen **	1735	04-26	234	1018	1367	1852	340	1132	60
Ptarmigan Lake **	1770	04-27	174	709	1080	1618	145	925	46
Josephine Lower **	1490	04-26	72	277	493	833	112	447	28

** Data collected in co-operation with U.S. Soil Conservation Service.

ALBERTA SNOW COURSE DATA
PLAINS AREA

Station Name	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
					Prior to 1983			
			1983	1982	Max.	Min.	Ave.	
ATHABASCA RIVER BASIN								
Barrhead, North	03-01	11	18	81	145	25	69	10
	03-15	16	33	109	109	36	63	10
	03-28	18	46	112	147	0	58	9
Barrhead, West	03-02	8	13	74	99	33	62	10
	03-15	13	28	84	84	36	55	9
	03-29	12	35	99	145	0	56	9
Edson	02-28	23	36	155	155	58	84	9
	03-15	23	54	165	165	25	82	10
	03-28	20	53	168	168	0	67	9
Embarras Portage *	02-03	N/A	N/A	52	76	52	62	4
	03-01	55	102	81	84	41	65	9
	03-15	48	97	86	112	48	77	10
	03-29	48	86	99	99	38	62	7
	04-12	45	132	N/A	119	119	119	2
Flatbush	03-01	21	28	89	99	51	74	10
	03-14	29	43	112	112	53	76	9
	03-28	21	45	122	175	0	79	8
Fort Chipewyan Airport*	02-02	47	86	39	74	28	48	9
	02-28	63	122	51	81	28	60	9
	03-14	64	152	64	119	28	72	11
	03-29	58	127	71	119	41	82	9
	04-13	38	114	N/A	76	43	60	3
Grassland	02-28	22	37	58	102	8	53	10
	03-15	21	46	107	107	10	49	9
	03-29	23	58	97	130	0	58	9
High Prairie	03-01	21	28	106	132	13	76	10
	03-14	15	29	111	112	38	72	9
	03-29	21	52	156	185	0	87	8
Highrock Tower	02-01	62	114	NA	79	28	49	8
	02-28	69	122	69	94	30	63	9
	03-14	68	130	66	107	33	70	9
	03-30	66	142	66	112	38	75	8
Hinton, North	03-01	31	51	122	122	41	73	9
	03-15	30	67	152	152	23	89	10
	03-28	32	68	157	157	0	80	9
Jackfish Village	03-01	52	91	53	94	43	66	7
	03-15	45	97	71	102	33	71	9
	03-29	48	94	81	193	23	89	10
	04-13	27	69	0	76	41	53	7
Kinuso	03-02	25	43	104	107	23	78	10
	03-14	30	52	130	130	38	78	9
	03-28	19	43	155	163	0	80	8
Lodgepole #1	02-28	28	42	119	137	51	87	10
	03-15	26	59	157	157	28	81	18
	03-28	32	74	157	165	0	80	11
Mayerthorpe Snow Pillow *	24-01	15	23	114	114	114	114	2
	03-02	22	36	114	117	55	80	8
	03-15	30	51	152	142	40	87	10
	03-29	21	59	150	188	13	84	10
Meadowview	03-02	16	30	104	137	54	82	11
	03-15	20	46	132	132	25	73	18
	03-29	20	54	124	160	0	79	10

Station Name	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
			1983	1982	Prior to 1983 Max.	Min.	Ave.	
ATHABASCA RIVER BASIN (CONT'D)								
Obed	02-28	18	29	165	165	0	76	9
	03-15	23	45	178	178	0	90	10
	03-28	29	63	196	196	0	83	9
Perryvale, East	02-28	21	32	58	137	36	69	10
	03-15	23	37	94	94	48	68	9
	03-29	19	36	84	150	0	71	8
Saulteaux River at Highway #2	03-01	26	38	84	112	43	77	10
	03-14	34	52	109	109	48	76	9
	03-28	31	61	124	198	23	84	8
Twin Lakes*	25-01	14	18	84	84	84	84	2
	03-02	15	28	94	94	94	94	2
	03-15	18	31	109	109	109	109	2
	03-29	16	43	119	119	119	119	2
Westlock #2	03-01	16	28	76	130	13	60	12
	03-14	19	34	112	112	0	58	19
	03-28	18	45	104	160	0	50	9
Whitecourt	03-02	15	28	99	157	56	90	10
	03-14	18	32	127	127	49	89	9
	03-29	19	49	109	157	0	79	8
CHURCHILL RIVER BASIN								
Bonnyville, North	02-28	26	35	76	119	36	63	9
	03-16	23	49	102	102	25	59	9
	03-30	21	53	89	155	0	68	9
NORTH SASKATCHEWAN RIVER BASIN								
Bellis	02-28	27	39	64	122	46	75	10
	03-15	26	56	112	112	56	82	9
	03-29	29	55	112	152	29	91	7
Brazeau	02-28	31	51	94	94	58	75	7
	03-14	28	62	127	127	41	77	7
	03-28	24	61	126	126	0	58	7
Brown Creek	03-02	33	43	71	132	36	64	7
	03-14	24	51	79	137	31	65	6
	03-29	28	54	87	147	18	69	7
Bruce*	03-02	28	30	69	74	43	57	8
	03-14	21	46	97	97	43	71	9
	03-28	24	44	94	94	10	72	8
Clandonald	03-01	26	41	53	122	13	57	10
	03-16	22	43	81	81	20	55	9
	03-30	19	38	81	168	0	63	9
Coronation	02-28	19	36	45	99	13	41	10
	03-14	0	0	43	102	0	33	8
	03-28	0	0	33	165	0	35	9
Crimson Lake	03-02	35	61	86	99	8	64	10
	03-14	25	53	104	114	0	72	8
	03-29	25	64	101	122	0	69	9
Elk Island Park	03-02	23	28	84	152	46	78	10
	03-16	18	32	114	114	27	76	9
	03-30	19	48	114	180	0	90	7

Station Name	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
			1983	1982	Prior to 1983 Max.	Min.	Ave.	
NORTH SASKATCHEWAN RIVER BASIN (CONT'D)								
Gadsby	02-28	7	8	46	99	0	46	10
	03-14	0	0	64	64	0	32	8
	03-28	0	0	58	135	0	33	8
Leduc	03-02	21	41	102	130	56	81	10
	03-15	14	42	130	130	38	76	9
	03-30	11	38	135	168	0	72	9
Lougheed	03-01	25	30	66	74	30	53	9
	03-14	17	36	76	79	0	48	9
	03-28	8	13	71	119	0	60	8
Mannville	03-01	22	36	56	104	30	57	9
	03-14	17	37	81	81	0	47	9
	03-28	16	47	71	109	0	45	8
Morinville	03-01	9	17	46	130	30	58	10
	03-14	17	36	94	94	20	55	9
	03-28	12	32	97	170	0	62	8
Nordegg	03-02	29	62	61	90	6	46	9
	03-14	24	57	76	89	15	62	8
	03-29	30	75	97	109	0	67	9
Onoway	03-03	11	15	81	109	33	61	10
	03-15	13	22	112	112	8	51	9
	03-29	1	2	107	196	0	54	8
Pipestone Creek*	03-02	17	28	102	102	18	64	8
	03-15	9	24	137	137	0	57	8
	03-30	10	39	124	124	0	46	6
Saint Paul	03-01	14	24	36	99	13	51	10
	03-16	8	14	71	99	18	49	9
	03-30	6	17	74	117	0	53	9
Two Hills	03-02	25	37	38	124	28	59	10
	03-16	21	41	76	76	29	51	9
	03-30	16	52	86	152	0	65	8
Wainwright	03-01	26	40	30	51	28	39	8
	03-14	17	31	56	56	0	37	9
	03-28	14	44	53	150	0	36	8
Weskatenau	02-28	19	31	53	117	30	64	10
	03-15	20	38	86	86	41	65	9
	03-29	19	46	97	147	0	73	8
Wetaskiwin	03-02	15	23	69	69	0	42	10
	03-15	9	25	97	97	0	42	8
	03-30	5	18	99	99	0	28	8
PEACE RIVER BASIN								
Bezanson	02-28	33	55	145	145	41	78	9
	03-14	28	64	144	144	18	81	10
	03-29	31	75	140	193	0	71	8
Eureka River	03-02	46	60	56	127	51	79	10
	03-15	39	48	62	122	61	89	9
	03-30	49	34	52	155	0	80	7
Fairview	03-02	25	36	86	130	22	78	10
	03-15	19	42	105	117	16	88	10
	03-30	25	43	102	112	0	73	7
Girouxville	03-01	21	37	107	130	28	71	10
	03-14	14	27	126	127	0	66	9
	03-29	14	32	116	124	0	59	8

Station Name	Date of Survey (Mo-Day)	Snow Depth (cm) 1983	Water Equivalent (mm)					Total Years of Record
			1983	1982	Prior to 1983 Max.	Min.	Ave.	
PEACE RIVER BASIN (CONT'D)								
Hythe	02-28	42	61	133	142	30	72	10
	03-15	35	66	151	151	0	64	9
	03-29	45	110	130	173	0	56	8
Little Smoky River	03-01	29	47	141	141	56	95	8
	03-14	20	35	146	146	0	93	10
	03-29	11	27	164	164	0	92	7
North Star Manning	03-02	39	74	64	86	0	41	9
	03-15	34	75	75	99	0	42	9
	03-30	35	80	95	107	0	47	7
Rycroft, South	03-01	24	37	116	127	0	60	10
	03-15	22	54	126	126	0	50	9
	03-30	33	58	146	155	0	65	7
Sexsmith, North	02-28	32	50	141	190	36	99	10
	03-15	29	65	160	160	36	99	9
	03-29	38	91	131	218	48	112	7
Spring Creek #1*	01-31	28	27	127	137	53	90	17
	02-28	29	56	178	180	61	119	17
	03-14	20	34	182	213	58	127	16
	03-28	22	50	183	216	10	116	16
Spring Creek #2*	01-31	27	24	124	130	46	82	17
	02-28	26	50	166	166	51	110	17
	03-14	15	27	147	198	53	112	16
	03-28	15	40	157	208	10	99	16
Spring Creek #3	01-31	29	44	118	145	56	89	17
	02-28	31	48	169	180	58	116	16
	03-14	24	33	179	206	63	124	16
	03-28	24	53	179	216	0	113	16
Spring Creek #4	01-31	27	42	124	140	53	90	16
	02-28	28	51	189	189	61	120	16
	03-14	24	43	191	191	69	122	15
	03-28	24	57	193	224	13	117	15
Sweet Grass	03-02	64	140	69	76	36	53	7
	03-16	63	137	64	64	33	52	6
	03-30	61	137	64	66	28	54	7
RED DEER RIVER BASIN								
Bentley	03-01	26	48	66	79	7	44	10
	03-15	10	24	66	79	0	45	7
	03-29	4	14	69	150	0	55	9
Hoadley	03-01	17	25	74	74	6	47	9
	03-15	0	0	99	102	0	56	9
	03-29	0	0	99	163	0	60	9
Innisfail #1, East	02-28	33	61	56	99	15	53	9
	03-14	20	52	69	112	0	56	9
	03-28	12	44	25	86	0	39	8
Innisfail #2, East	02-28	18	25	36	53	0	27	8
	03-14	3	10	43	89	0	32	7
	03-28	0	0	23	122	0	33	8
Innisfail #3, West	02-28	22	38	56	97	44	63	10
	03-15	8	18	71	124	0	67	7
	03-28	5	16	56	112	0	62	9
James River	03-01	37	53	58	107	31	62	9
	03-15	30	60	69	122	41	76	8
	03-29	31	71	76	122	43	83	9
Sundre	03-01	21	38	28	84	6	46	9
	03-14	7	15	36	107	0	53	8
	03-29	0	0	38	119	0	52	9

* Snow pillow data available at these sites.

SACRAMENTO STORAGE GAUGE DATA
WINTER PRECIPITATION TOTAL

ACCUMULATED PRECIPITATION SINCE OCTOBER 1982

Gauge No.	Station Name	Date of Reading 1983 (Mo-Day)	82/83 (mm)	81/82 (mm)	Average[1] (mm)
A01	Castle Ranger Station	03-01 03-30	165 229	150 241	228 248
A09	Carpenter Creek	03-01 03-30	178 241	292 267	212 240
A11	Goat Creek	03-03 N/A	394 N/A	368 457	401 457
B10	Crownest Creek	03-01 03-30	178 229	267 317	238 276
C10	Oyster Creek	03-01 03-30	102 114	N/A 241	178 200
C13	Livingstone Gap	03-01 03-30	64 89	76 102	132 148
C16	Racehorse Creek	01-28 N/A	254 N/A	508 546	433 427
D01	Willow Creek Ranger Station	03-01 03-30	89 89	25 89	102 155
E01	West Porcupine	03-01 03-30	89 89	51 89	79 117
G01	Highwood Ranger Station	03-01 03-31	38 51	13 63	82 112
K01	Canmore Ranger Station	03-01 03-31	38 57	25 102	71 113
L01	Ghost Ranger Station	03-03 03-31	51 76	64 102	76 104
M01	Red Deer Ranger Station	02-08 03-31	25 51	50 89	65 103

All storage gauge data collected with the cooperation of the Alberta Forestry Service.

[1] Based on the last seven years' data.

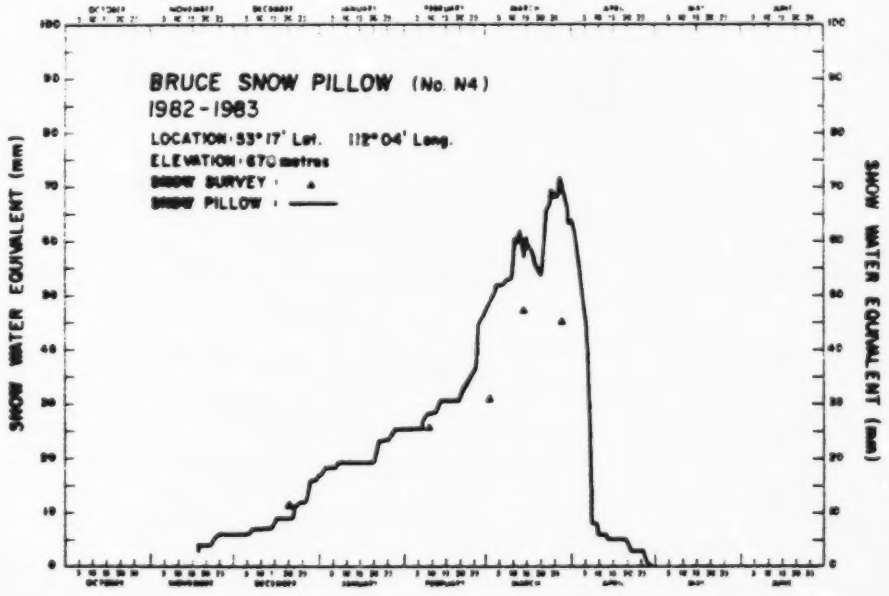
LIST OF SNOW PILLOWS

1982 - 1983

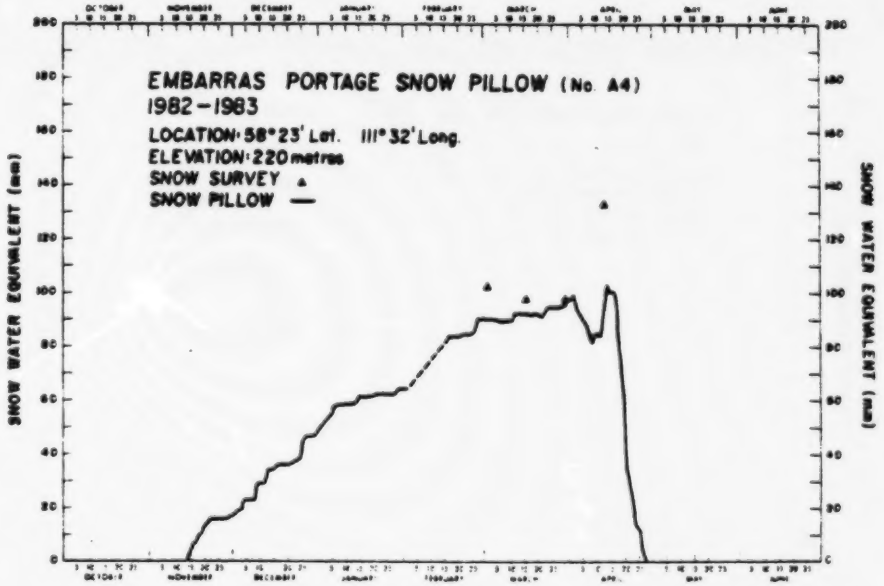
NAME	SNOW COURSE NUMBER	DRAINAGE BASIN	ELEVATION (METRES)
Akamina	14Z07	Oldman	1800
Bruce	N4	North Saskatchewan	670
Embarras Portage	A4	Athabasca	220
Fort Chipewyan Airport	A6	Athabasca	210
Little Elbow Summit	14Y18	Bow	2160
Limestone Ridge	15X06	North Saskatchewan	1950
Mayerthorpe	A25	Athabasca	760
Mount Skoki	16X15	Bow	2055
Pipestone *	N16	North Saskatchewan	790
Spring Creek #1	P10	Peace	720
Spring Creek #2	P11	Peace	655
Sunshine Village	15X03	Bow	2225
Twin Lakes	A26	Athabasca	655

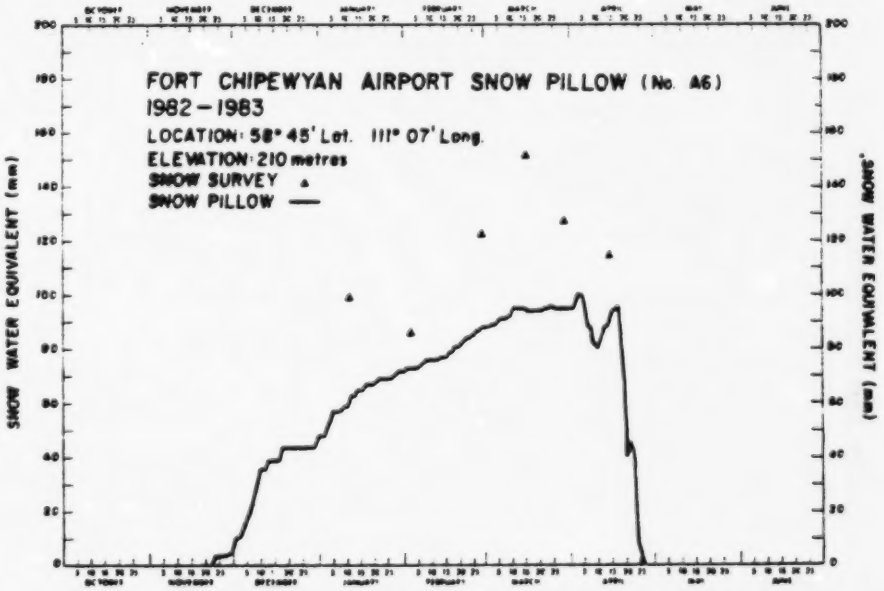
* Because of a malfunction at the Pipestone snow pillow, no plot is available.

SNOW PILLOW DATA

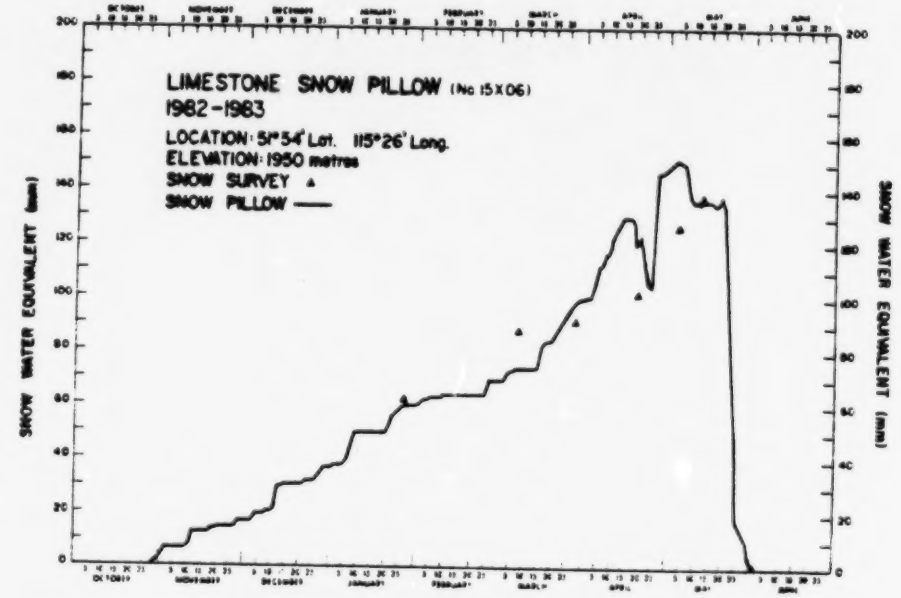

BRUCE SNOW PILLOW (No. N4)
1982 - 1983
LOCATION: 53° 17' Lat. 112° 04' Long.
ELEVATION: 670 metres
SNOW SURVEY : ▲
SNOW PILLOW : —
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)

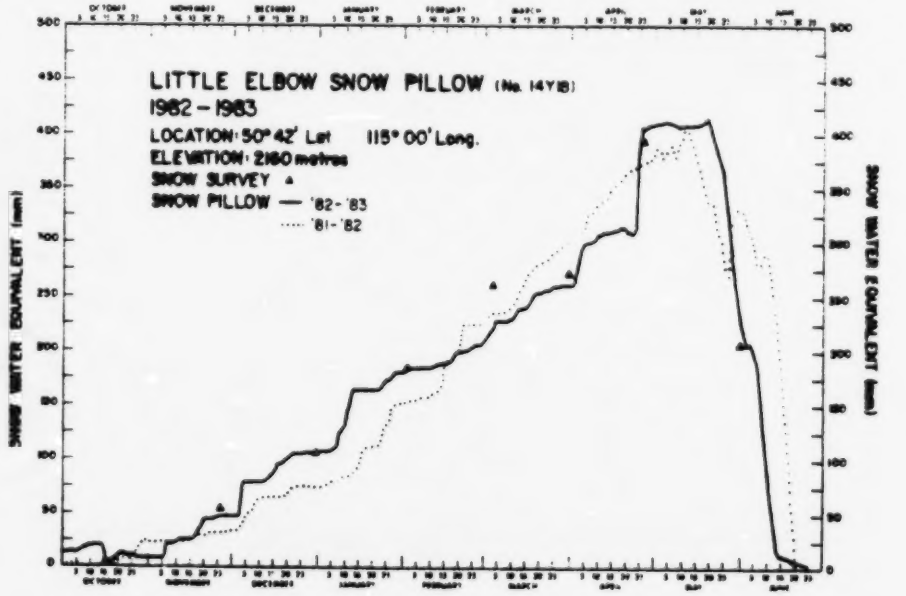
SNOW PILLOW DATA


EMBARRAS PORTAGE SNOW PILLOW (No. A4)
1982 – 1983
LOCATION: 58° 23' Lat. 111° 32' Long.
ELEVATION: 220 metres
SNOW SURVEY ▲
SNOW PILLOW —
SNOW WATER EQUIVALENT (mm)

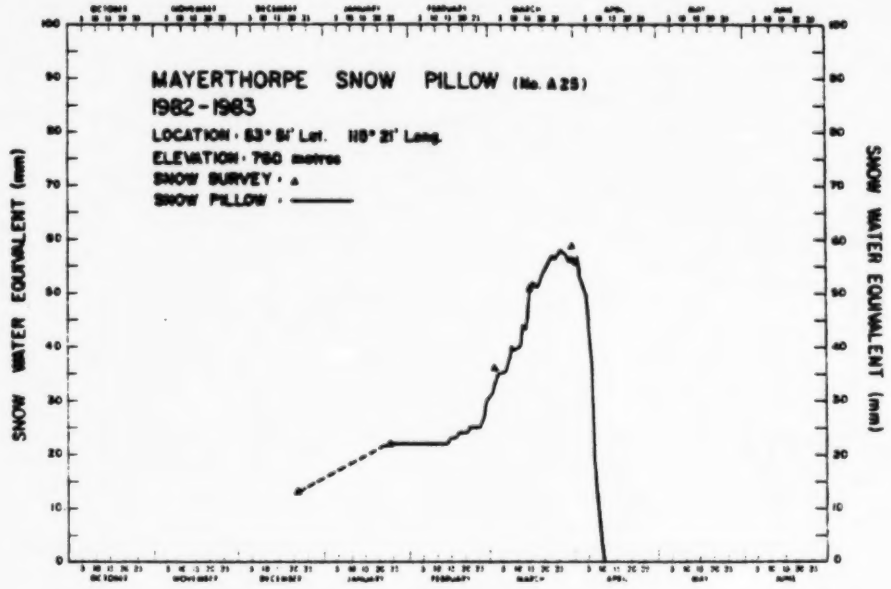

FORT CHIPEWYAN AIRPORT SNOW PILLOW (No. A6)
1982 – 1983
LOCATION: 58° 45' Lat. 111° 07' Long.
ELEVATION: 210 metres
SNOW SURVEY ▲
SNOW PILLOW —
SNOW WATER EQUIVALENT (mm)

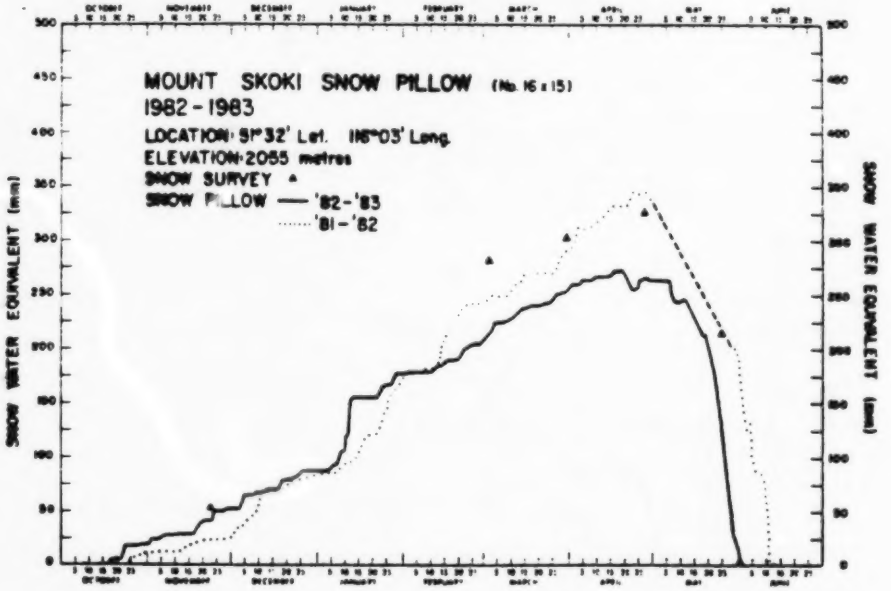
SNOW PILLOW DATA



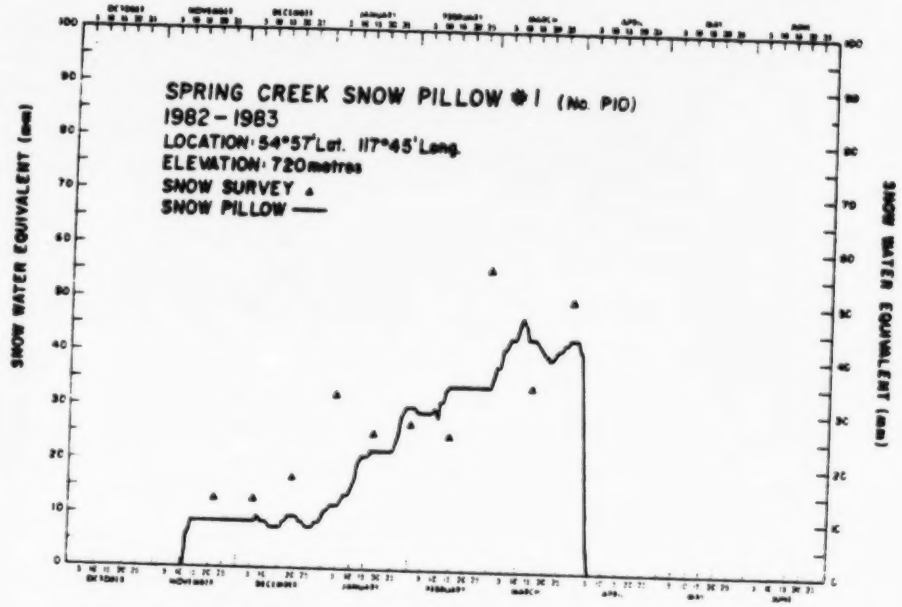


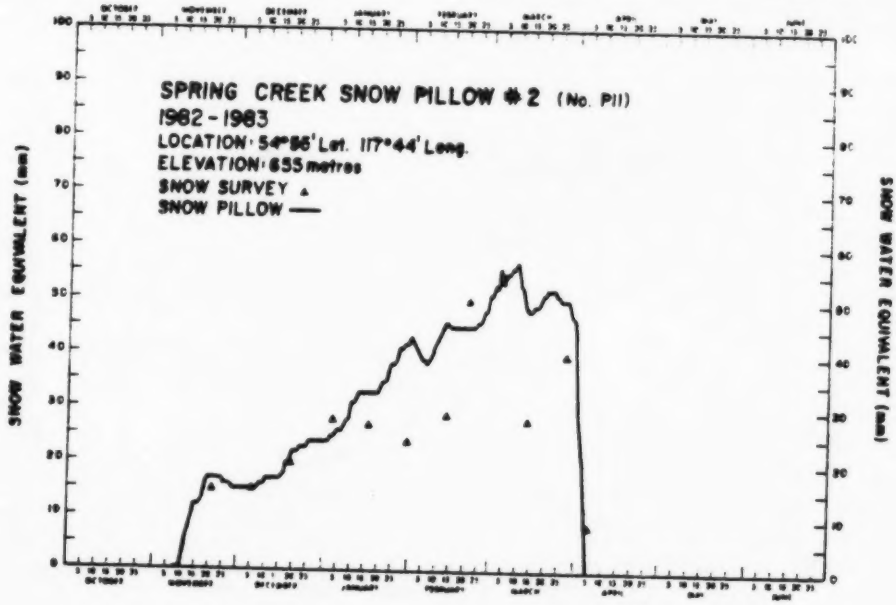
SNOW PILLOW DATA


MAYERTHORPE SNOW PILLOW (No. A 25)
1982 - 1983
LOCATION - 53° 51' Lat. 118° 21' Long.
ELEVATION - 780 metres
SNOW SURVEY - △
SNOW PILLOW - ———
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)

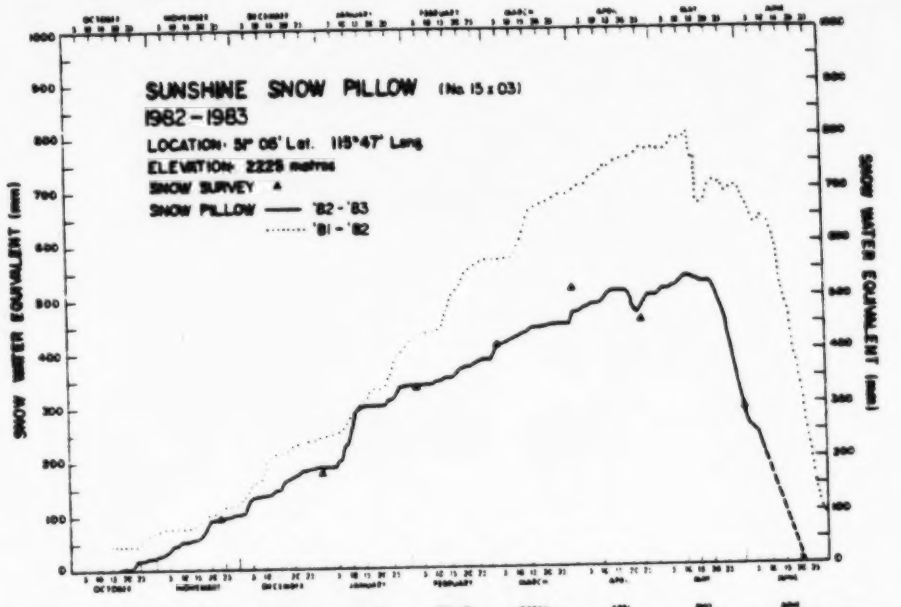

MOUNT SKOKI SNOW PILLOW (No. 16 x 15)
1982 - 1983
LOCATION - 51° 32' Lat. 116° 03' Long.
ELEVATION - 2055 metres
SNOW SURVEY △
SNOW PILLOW —— '82 - '83
..... '81 - '82
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)

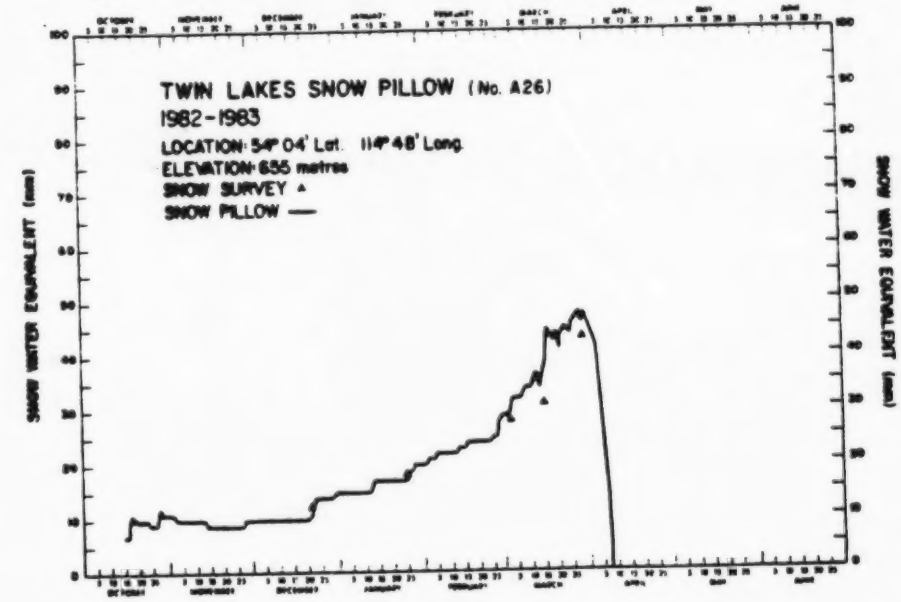
SNOW PILLOW DATA


SPRING CREEK SNOW PILLOW # 1 (No. P10)
1982 - 1983
LOCATION: 54°57' Lat. 117°45' Long.
ELEVATION: 720 metres
SNOW SURVEY ▲
SNOW PILLOW ——
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)


SPRING CREEK SNOW PILLOW # 2 (No. P11)
1982 - 1983
LOCATION: 54°56' Lat. 117°44' Long.
ELEVATION: 655 metres
SNOW SURVEY ▲
SNOW PILLOW ——
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)

SNOW PILLOW DATA

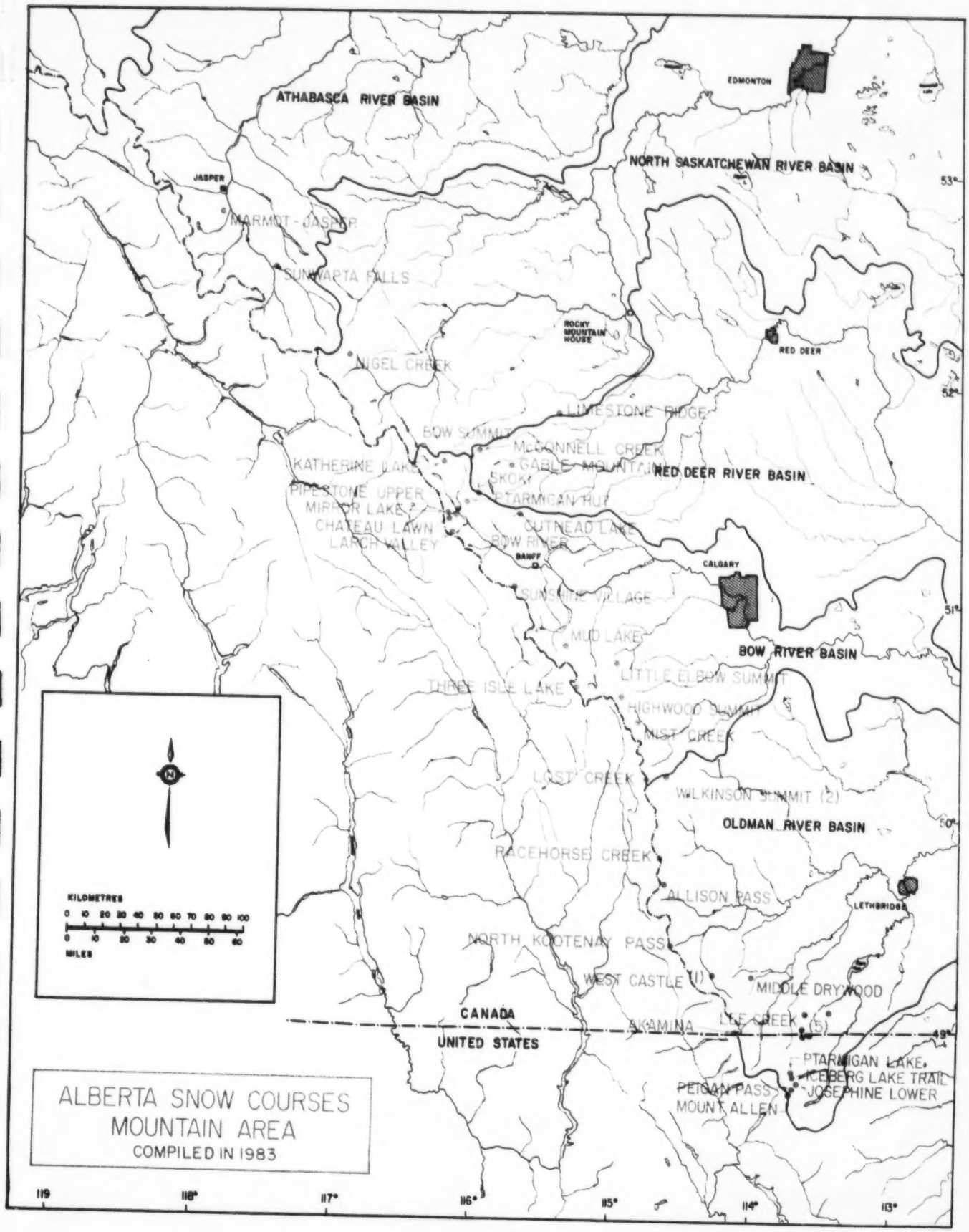

SUNSHINE SNOW PILLOW (No. 15 x 03)
1982 - 1983
LOCATION: 51° 05' Lat. 115°47' Long.
ELEVATION: 2225 metres
SNOW SURVEY ▲
SNOW PILLOW —— '82 - '83
..... '81 - '82
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)


TWIN LAKES SNOW PILLOW (No. A26)
1982 - 1983
LOCATION: 54° 04' Lat. 114° 48' Long.
ELEVATION: 655 metres
SNOW SURVEY ▲
SNOW PILLOW —
SNOW WATER EQUIVALENT (mm)
SNOW WATER EQUIVALENT (mm)

APPENDIX B

INDEX OF

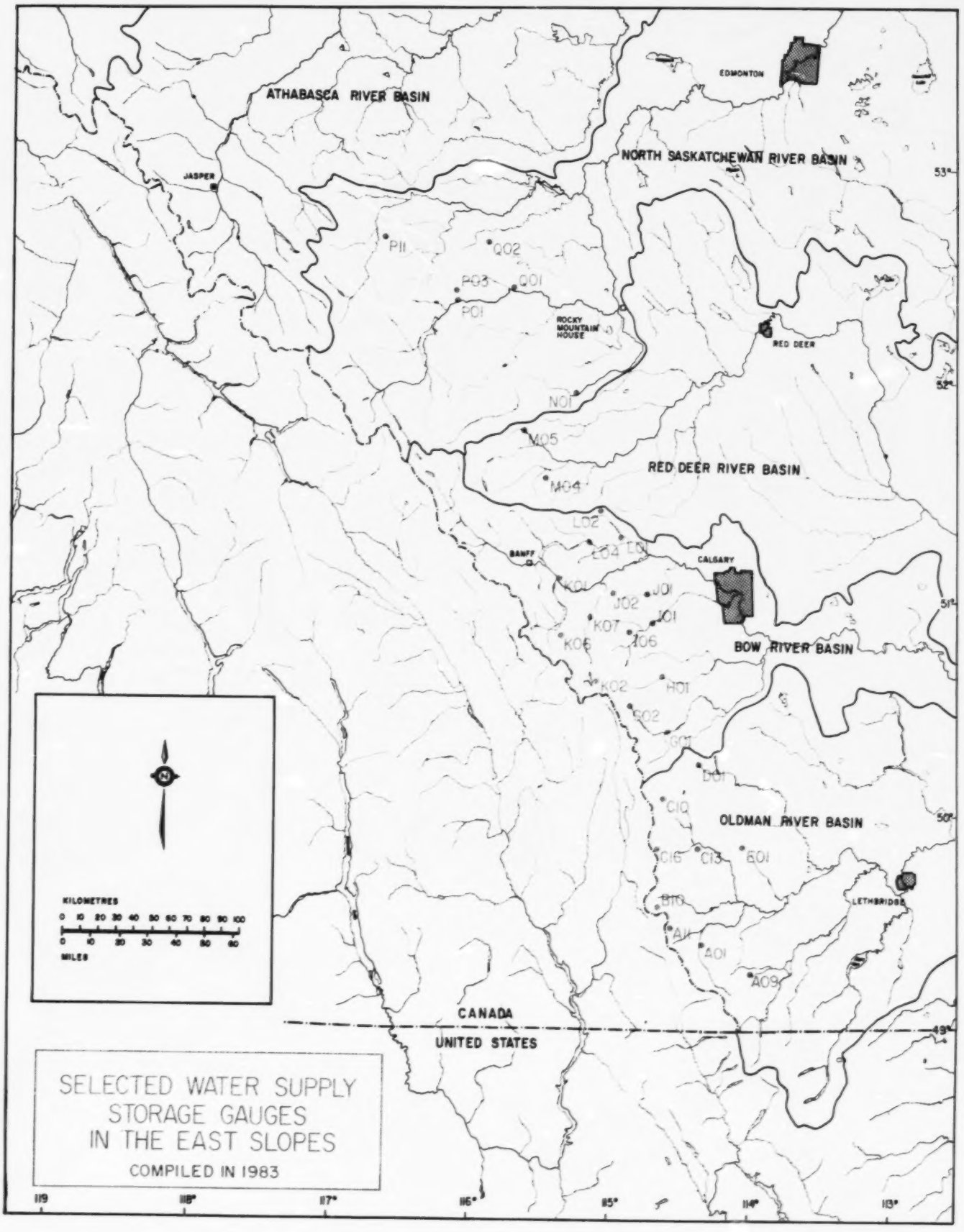
SNOW SURVEY
AND
STORAGE GAUGE LOCATIONS


ATHABASCA RIVER BASIN
EDMONTON
NORTH SASKATCHEWAN RIVER BASIN
JASPER
MARMOT - JASPER
SUNWAPTA FALLS
ROCKY MOUNTAIN HOUSE
RED DEER
NIGEL CREEK
LIMESTONE RIDGE
BOW SUMMIT
McCONNELL CREEK
GABLE MOUNTAIN
KATHERINE LAKE
SKOKI
RED DEER RIVER BASIN
PIPESTONE UPPER
PTARMIGAN HUT
MIRROR LAKE
CHATEAU LAWN
OUTHEAD LAKE
LARCH VALLEY
BOW RIVER
BANFF
CALGARY
SUNSHINE VILLAGE
MUD LAKE
BOW RIVER BASIN
LITTLE ELBOW SUMMIT
THREE ISLE LAKE
HIGHWOOD SUMMIT
MIST CREEK
LOST CREEK
WILKINSON SUMMIT (2)
OLDMAN RIVER BASIN
RACEHORSE CREEK
ALLISON PASS
LETHBRIDGE
NORTH KOOTENAY PASS
WEST CASTLE (1)
MIDDLE DRYWOOD
CANADA
UNITED STATES
AKAMINA
LEE CREEK (5)
PTARMIGAN LAKE
ICEBERG LAKE TRAIL
PEIGAN PASS
JOSEPHINE LOWER
MOUNT ALLEN
KILOMETRES
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60
MILES
ALBERTA SNOW COURSES
MOUNTAIN AREA
COMPILED IN 1983
119
118°
117°
116°
115°
114°
113°
53°
52°
51°
50°
49°

ALBERTA SNOW COURSES

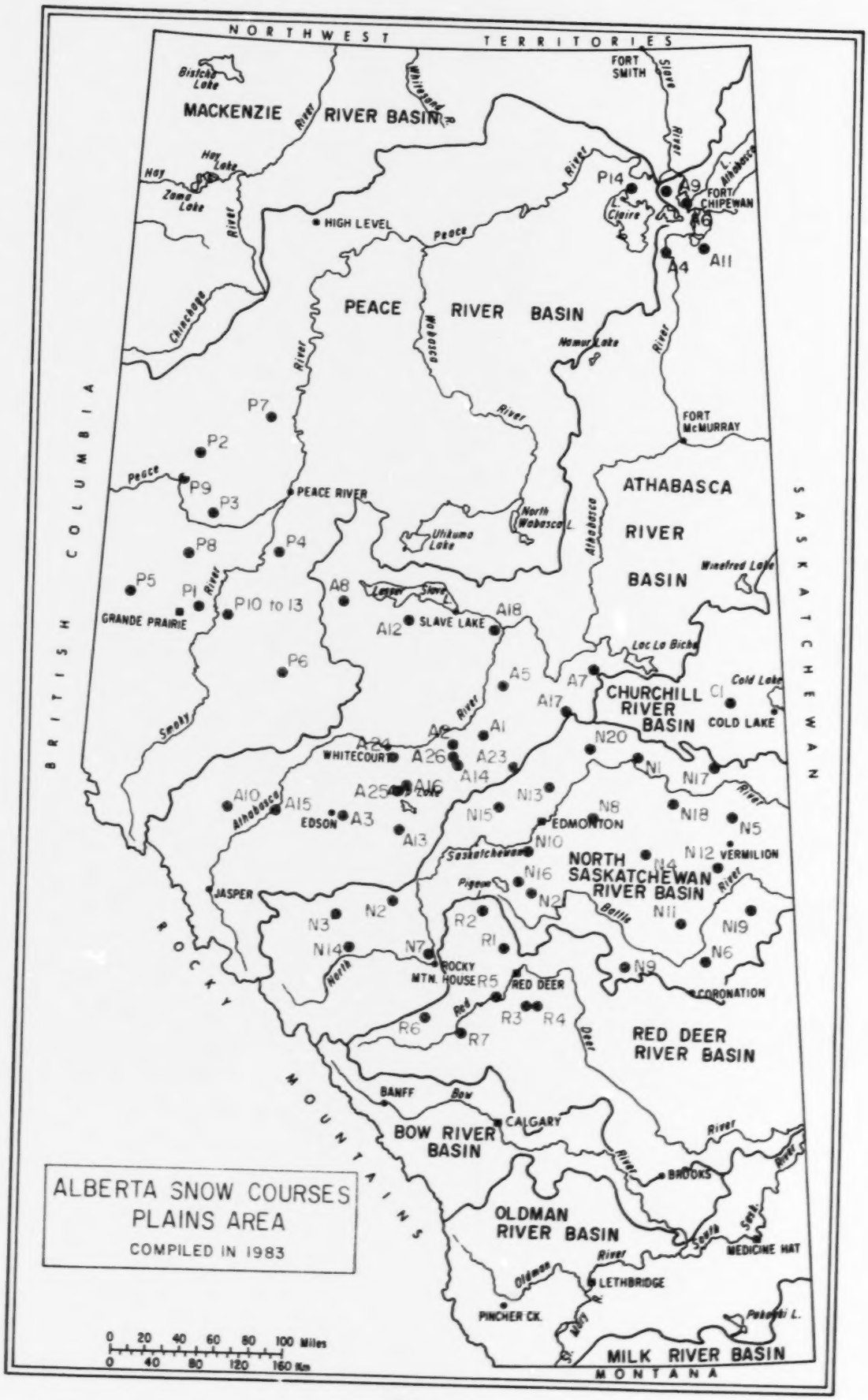
MOUNTAIN AREA

Station Number	Name	Location Lat.	Location Long.	Elevation (m)	Year Established
ATHABASCA RIVER BASIN					
18W02	Marmot-Jasper	52°49'	118°05'	1830	1970
17W01	Sunwapta Falls	52°33'	117°39'	1400	1968
BOW RIVER BASIN					
16X01	Bow River	51°25'	116°28'	1550	1937
16X13	Bow River Summit (II)	51°42'	116°28'	2030	1979
16X08	Chateau Lawn	51°25'	116°13'	1740	1940
15X04	Cuthead Lake	51°27'	115°45'	2210	1979
14Y04	Highwood Summit (Open)	50°26'	114°59'	2210	1963
14Y05	Highwood Summit (Bush)	50°36'	114°59'	2210	1963
16X16	Katherine Lake	51°41'	116°23'	2380	1980
16X14	Larch Valley	51°20'	116°13'	2360	1979
14Y20	Lost Creek	50°11'	114°43'	2130	1982
14Y18	Little Elbow Summit	50°42'	115°00'	2160	1978
16X06	Mirror Lake	51°25'	116°14'	2010	1940
14Y07	Mist Creek	50°31'	114°51'	1750	1965
16X15	Mount Skoki	51°32'	116°03'	2055	1979
15Y02	Muc Lake	50°48'	115°19'	1890	1968
16X02	Pipestone, Upper	51°26'	116°10'	1615	1937
16X09	Ptarmigan Hut	51°28'	116°06'	2180	1967
15X03	Sunshine Village	51°05'	115°47'	2225	1967
15Y03	Three Isle Lake	50°38'	115°17'	2160	1981
NORTH SASKATCHEWAN RIVER BASIN					
15X06	Limestone Ridge	51°53'	115°23'	1950	1982
17W02	Nigel Creek	52°11'	117°05'	1950	1968
OLDMAN RIVER BASIN					
14Z07	Akamina	49°01'	114°05'	1770	1980
14Z03	Allison Pass	49°44'	114°37'	1980	1962
13Z02	Lee Creek Site D	49°01'	113°37'	1660	1971
13Z03	Lee Creek Site E	49°01'	113°39'	1680	1971
13Z04	Lee Creek Site F	49°03'	113°29'	1570	1971
13Z07	Lee Creek Site P	49°00'	113°34'	1520	1971
13Z08	Lee Creek Site Q	49°03'	113°36'	1490	1971
14Z05	Middle Drywood	49°15'	114°03'	1570	1962
14Z09	North Kootenay Pass	49°24'	114°34'	1970	1982
14Z08	Racehorse Creek	49°49'	114°38'	1920	1982
14Z01	West Castle Storage (Bush)	49°16'	114°21'	1520	1962
14Y09	Wilkinson Summit (Bush)	50°12'	114°33'	1980	1963
14Y08	Wilkinson Summit (Open)	50°12'	114°33'	1980	1964
RED DEER RIVER BASIN					
15X05	Gable Mountain	51°38'	115°45'	2150	1981
16X17	McConnell Creek	51°41'	115°59'	2130	1981


ATHABASCA RIVER BASIN
NORTH SASKATCHEWAN RIVER BASIN
RED DEER RIVER BASIN
BOW RIVER BASIN
OLDMAN RIVER BASIN
EDMONTON
JASPER
ROCKY MOUNTAIN HOUSE
RED DEER
CALGARY
BANFF
LETHBRIDGE
CANADA
UNITED STATES
KILOMETRES
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60
MILES
SELECTED WATER SUPPLY STORAGE GAUGES IN THE EAST SLOPES
COMPILED IN 1983
53°
52°
51°
50°
49°
119
118°
117°
116°
115°
114°
113°

ALBERTA FOREST SERVICE
SACRAMENTO STORAGE GAUGE NETWORK

Gauge Number	Name	Location Lat.	Location Long.	Elevation (m)	Year Established
CROWSNEST FOREST RESERVE					
A01	Castle Ranger Station	49°23'	114°21'	1390	1953
A09	Carpenter Creek	49°15'	114°03'	1680	1956
A11	Goat Creek	49°29'	114°34'	1860	1964
B10	Crowsnest Creek	49°36'	114°40'	1460	1954
C10	Oyster Creek	50°07'	114°40'	1830	1955
C13	Livingstone Gap	49°52'	114°20'	1420	1954
C16	Racehorse Creek	49°49'	114°38'	1920	1964
D01	Willow Creek Ranger Station	50°14'	114°21'	1490	1956
E01	West Porcupine	49°51'	114°04'	1450	1953
BOW RIVER FOREST RESERVE					
G01	Highwood Ranger Station	50°23'	114°38'	1490	1953
G02	Mist Creek	50°31'	114°51'	1750	1953
H01	Sheep Ranger Station	50°36'	114°47'	1770	1953
I01	Elbow Ranger Station	50°54'	114°40'	1400	1953
I06	Ford Creek Summit	50°51'	114°53'	1830	1954
J01	Jumpingpound Ranger Station	51°02'	114°44'	1400	1953
J02	Sibbald Creek Summit	51°02'	114°59'	1550	1954
K01	Canmore	51°07'	115°22'	1330	1953
K02	Kananaskis Lakes	50°38'	115°07'	1680	1953
K06	Mud Lake	50°51'	115°21'	1905	1954
K07	Kananaskis Ranger Station	50°54'	115°08'	1510	1954
L01	Ghost Ranger Station	51°20'	114°57'	1370	1953
L02	Mockingbird Lookout	51°25'	115°04'	1905	1963
L04	Ghost Diversion	51°18'	115°08'	1600	1963
M04	Panther River	51°35'	115°28'	1860	1964
M05	Scalp Creek	51°48'	115°39'	2040	1964
CLEARWATER FOREST RESERVE					
N01	Clearwater Ranger Station	51°59'	115°20'	1280	1953
P01	Nordegg Ranger Station	52°29'	116°06'	1370	1953
P03	Shunda Baldy Lookout	52°32'	116°07'	2080	1964
P11	Brown Creek	52°43'	116°45'	1830	1964
Q01	Shunda Ranger Station	52°20'	115°47'	1400	1954
Q02	Atlas Lumber	52°42'	115°27'	1220	1956


NORTHWEST TERRITORIES
MACKENZIE RIVER BASIN
PEACE RIVER BASIN
ATHABASCA RIVER BASIN
CHURCHILL RIVER BASIN
NORTH SASKATCHEWAN RIVER BASIN
RED DEER RIVER BASIN
BOW RIVER BASIN
OLDMAN RIVER BASIN
MILK RIVER BASIN
BRITISH COLUMBIA
SASKATCHEWAN
MONTANA
ROCKY MOUNTAINS
FORT SMITH
FORT CHIPEWAN
FORT McMURRAY
HIGH LEVEL
PEACE RIVER
GRANDE PRAIRIE
SLAVE LAKE
WHITECOURT
EDSON
JASPER
EDMONTON
COLD LAKE
VERMILION
ROCKY MTN. HOUSE
RED DEER
CORONATION
CALGARY
BANFF
BROOKS
MEDICINE HAT
LETHBRIDGE
PINCHER CK.
Bistcho Lake
Hay Lake
Zama Lake
Chinchaga River
Peace River
Whitemud River
Slave River
L. Athabasca
L. Claire
Hamur Lake
Wabasca River
Athabasca River
North Wabasca L.
Utikuma Lake
Lesser Slave L.
Winefred Lake
Loc La Biche
Cold Lake
Smoky River
Athabasca
Saskatchewan
Pigeon
Battle River
North Red Deer River
Red Deer River
Bow River
Oldman River
South Saskatchewan River
Waterton River
Pakowki L.
P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 to 13 P14
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A23 A24 A25 A26
C1
N1 N2 N3 N4 N5 N6 N7 N8 N9 N10 N11 N12 N13 N14 N15 N16 N17 N18 N19 N20 N21
R1 R2 R3 R4 R5 R6 R7
ALBERTA SNOW COURSES
PLAINS AREA
COMPILED IN 1983
0 20 40 60 80 100 Miles
0 40 80 120 160 Km

LIST OF ALBERTA SNOW COURSES

PLAINS AREA

Station Name (#)	Location Lat.	Location Long.	Elevation (metres)	Year Established
ATHABASCA RIVER BASIN				
Barrhead, North (A1)	54°16'	114°21'	670	1973
Barrhead, West (A2)	54°11'	114°48'	670	1973
Edson, East (A3)	53°35'	116°14'	910	1973
Embarras Portage (A4)	58°23'	111°32'	220	1974
Flatbush (A5)	54°44'	114°05'	640	1973
Fort Chipewyan Airport (A6)	58°45'	111°07'	210	1974
Grassland (A7)	54°49'	112°41'	580	1973
High Prairie (A8)	55°24'	116°25'	580	1973
Highrock Tower (A9)	58°48'	111°33'	220	1974
Hinton, North (A10)	53°32'	117°57'	1250	1973
Jackfish Village (A11)	58°25'	110°56'	210	1974
Kinuso (A12)	55°20'	115°24'	640	1973
Lodgepole #1 (A13)	53°30'	115°21'	850	1961
Mayerthorpe (A25)	53°51'	115°21'	760	1981
Meadowview (A14)	53°59'	114°41'	670	1960
Obed (A15)	53°34'	117°13'	1100	1973
Paddle River #2 (A16)	53°52'	115°19'	760	1974
Perryvale, East (A17)	54°28'	113°10'	670	1973
Saulteaux River (A18) at Highway #2	55°10'	114°14'	580	1973
Twin Lakes (A26)	54°04'	114°48'	655	1982
Westlock #2 (A23)	54°00'	113°58'	700	1959
Whitecourt (A24)	54°05'	115°36'	790	1973
CHURCHILL RIVER BASIN				
Bonnyville, North (C1)	54°30'	110°40'	550	1973
NORTH SASKATCHEWAN RIVER BASIN				
Bellis (N1)	54°07'	112°05'	670	1973
Brazeau (N2)	52°57'	115°41'	975	1977
Brown Creek (N3)	52°46'	116°26'	1340	1977
Bruce (N4)	53°17'	112°04'	670	1975
Clandonald (N5)	53°34'	110°52'	640	1973
Coronation, Northeast (N6)	52°15'	111°15'	760	1973
Crimson Lake (N7)	52°25'	115°02'	975	1973
Elk Island National Park (N8)	53°35'	112°50'	700	1973
Gadsby (N9)	52°19'	112°23'	790	1973
Leduc (N10)	53°16'	113°33'	730	1973
Lougheed, South (N11)	52°40'	111°33'	670	1973
Mannville, South (N12)	53°10'	111°12'	670	1973
Morinville, North (N13)	53°51'	113°29'	700	1973
Nordegg, South (N14)	52°24'	116°08'	1070	1973
Onoway (N15)	53°43'	114°10'	700	1973
Pipestone Creek (N16)	53°04'	113°49'	790	1976
St. Paul, East (N17)	53°59'	111°01'	640	1973
Two Hills, East (N18)	53°43'	111°43'	640	1973
Wainwright (N19)	52°43'	110°37'	670	1973
Waskatenau (N20)	54°11'	112°50'	640	1973
Wetaskiwin (N21)	52°59'	113°38'	790	1973
PEACE RIVER BASIN				
Bezanson (P1)	55°14'	118°31'	700	1973
Eureka River (P2)	56°31'	118°44'	700	1973
Fairview (P3)	56°03'	118°24'	640	1973
Girouxville (P4)	55°46'	117°20'	580	1973
Hythe (P5)	55°19'	119°34'	760	1973
Little Smoky River (P6)	54°44'	117°09'	670	1973
North Star - Manning(P7)	56°52'	117°38'	490	1973
Rycroft, South (P8)	55°42'	118°44'	640	1973
Sexsmith, North (P9)	55°27'	118°53'	850	1973
Spring Creek Watershed Site #1 (P10)	54°57'08"	117°44'57"	720	1967
Spring Creek Watershed Site #2 (P11)	54°55'20"	117°44'33"	655	1967
Spring Creek Watershed Site #3 (P12)	54°57'12"	117°41'22"	730	1967
Spring Creek Watershed Site #4 (P13)	54°54'35"	117°41'15"	730	1967
Sweetgrass (P14)	58°50'30"	111°59'30"	210	1977
RED DEER RIVER BASIN				
Bentley (R1)	52°29'	114°04'	910	1978
Hoadley (R2)	52°49'	114°23'	975	1972
Innisfail #1, East (R3)	52°00'	113°42'	975	1973
Innisfail #2, East (R4)	52°01'	113°35'	910	1973
Innisfail, West (R5)	52°05'	114°10'	910	1973
James River (R6)	51°54'	115°00'	1220	1973
Sundre, East (R7)	51°47'	114°31'	1070	1973